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# Analysis of earnings manipulation practices of Finnish and German companies using Beneish M-score model

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Abstract

The research was aimed at exploring the earnings manipulations level using Beneish M-score model. The analysis was implemented over a period of six years on the basis of companies' data, which represents Finnish and German markets. The main objectives were to ascertain whether Beneish M-score model is capable of predicting earnings overstatements in the cases of Finland and Germany and to state which market yields less submission to the financial manipulations.

Secondary numeric data was acquired from official databases and financial statements of the companies on the both Finnish and German markets. The application of the SPSS software provided with an opportunity to conduct a correlational research and a descriptive statistics analysis. All in all, both methods assisted to test the stated hypothesizes and to answer the research questions. Correlational research afforded to gain information concerning the level of association between two variables in Beneish M-score formula. Descriptive statistics performed as an appropriate option to obtain the main characteristics about the market tendencies, and to identify which market is more favorable for the future investments.

The results disclose that there is a strong association between the Days' Sales in Receivable Index (DSRI), Gross Margin Index (GMI), the Total accrual to total assets (TATA), the Sales Growth Index (SGI), the AQI (Asset Quality Index), the Sales, General, Administrative Expenses Index (SGAI), and the M-score that affirms the hypothesis about the possibility to predict manipulations with the help of Beneish model. Furthermore, Finnish market is more stable and applicable for the trustworthy investments. The theoretical analyses allowed to draw the traits of high-quality earnings environment.



Keywords/tags (subjects)

Earnings quality, financial reporting quality, earnings management, Beneish M-score model


Miscellaneous

Appendices attached (29 pages)

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# ABBREVIATIONS

| | |
|---|---|
| AQI | Asset Quality Index |
| CEO | Chief Executive Officer |
| DEPI | Depreciation Index |
| DSRI | Days' Sales in Receivable Index |
| LVGI | Leverage Index |
| GAAP | Generally Accepted Accounting Principles |
| GMI | Gross Margin Index |
| SGAI | Sales, General and Administrative Expenses Index |
| SGI | Sales Growth Index |
| TATA | Total Accrual to Total Assets |

# 1. Introduction

The quality of published accounting information and the sound accounting policy within an enterprise plays a significant role in order to reduce the asymmetries between the companies and the future investors. With the help of the published accounting information, it is possible to conclude the potential investment strategy and earnings forecasts for the market participants. Generally speaking, each investor collides with a problem to choose the market and the company to invest in, thus, the incorporate financial policy should be carefully investigated beforehand.

One of the most contemporary techniques to evaluate the level of earnings manipulation is Beneish M-score model, which was conducted by the American Professor of Accounting-Daniel Beneish. This mathematical formula assists to estimate the likelihood of the potential earnings overstatements and incentives for the earnings management. As far as this model performs as the basis of the current thesis, the main research problem arises- what is the level of the earnings manipulation among Finnish and German companies and which market is more appropriate for the smooth investing policy; which variables of the formula might be the signals of the potential earnings manipulations and overstatements. The current study will contribute to the expansion of the Beneish M-score model popularity among the financial market participants and continuous future researches.

With the help of the extensive literature review, the researcher points out the following research questions in order to think the stated research problem out:

1) What are the characteristics of the sound earnings and reporting quality policy?
2) Which market is more fruitful and safe for the future investments in accordance with the extent of the earnings manipulations?

3) Which financial variables can signal about the non-compliance with the reporting accounting standards and probable earnings manipulations?

Therefore, in the current study the following principal targets are put forward for the continuous investigation and elucidation including to detect the main characteristics and impulses of the sound earnings quality and the corporate reporting policy, to describe the purposes and indicators of the earnings management and manipulations, to identify the potential model that can clue the ‘’earnings manipulators’’, namely, Beneish M-score model, to find out which variables of the M-score formula has the most significant impact on the M-score figure, to specify which of the Finnish and German markets is more sound and auspicious for the future investments.

So that to answer the stated research questions and to resolve the proposed research problems, the six-year analysis of the angle of earning manipulations on the market level, Finland- 60 companies and Germany- 60 companies, was implemented. The researcher derived the secondary financial data from the data tables, which was modified in purposes of the statistical analysis. The corporate financial information was gathered from the financial statements revealed from the annual reports of the companies. The next step was to assign the independent and dependent variables according to the mathematical Beneish M-score formula and to conduct the statistical analysis in SPSS software. The descriptive statistics and inferential correlations were realized, which enabled to gain deeper understanding about the financial situations on the both markets and to state the level of association between the independent and dependent variables in the formula.

Regarding to the outcomes of the research process, the following conclusions were uncovered in order to identify the solutions for the stated research problems, answers for the research questions, and the proof that is sufficient to accept the proposed hypothesis. First, it was detected that there is a positive association between the independent variables and depended variable- M-score of Beneish Model. With the help of the

correlations, the researcher conducts the strong relationship of a set of variables with the probability of the earnings management: Days' Sales in Receivable Index (DSRI), Gross Margin Index (GMI), the Total accrual to total assets (TATA), the Sales Growth Index (SGI), the AQI (Asset Quality Index), the Sales, General and Administrative Expenses Index (SGAI). Secondly, after the descriptive statistics analysis Finnish market was proved as the safer and more fruitful base for the future investments because the likelihood of the earnings manipulations is much lower in comparison with the German companies. In addition, the last significant outcome, the main characteristics of the sound earnings and reporting quality were detected through the theoretical and empirical analysis.

The current research paper is based on the logical structure that covers the full research process. The introducing and the most fateful part consists of the theoretical background, which enables to formulate the primary basis about the main concepts of the study such as corporate earnings quality, financial reporting quality, generic overview of earnings management and its impulses, and the explanation of the presumable mathematical theory in order to evaluate the scope of earnings manipulations- Beneish M-score model. The conjoint information of this chapter will afford the readers a basis for the profound consciousness about the research problems and derived hypothesizes. The following chapter of the thesis, the empirical literature review, will provide with an opportunity to uncover thesis goals from the more precise perspective. Moreover, the overview of the current scientific studies and an emphasis upon the most contemporary patterns will prescribe the description of Beneish M-score model more accuracy and relevancy. Pursuant to the combination of the theoretical and empirical review, the reasoned hypotheses are placed for the studies. The next chapters of the paper, research methodology, interpret the main research techniques and concentrates mostly on the explanation of the thesis from the research point of view. Such terms as research design, strategy, purpose, methods of data collection, sampling, analysis methods, and validity and reliability afford an opportunity to implement a deliberate

research in order to answer the main research questions and to achieve research targets. The chapter ‘‘Research results’’ illustrates the main outcomes of the statistical analyses and the main definitions about the relation between dependent and independent variables. With the help of the statistical correlations, the researcher might draw the outcomes concerning the examinations of the stated hypotheses. The completive part of the thesis ‘’Discussion’’ designates the short outlook on the research results, holds out the rigid recommendations limitations, implies the potential tips for the future research projects how to make the research results more specific and justified.

# 2. Theoretical Background

In this chapter of the thesis, the main concepts of the study are being discussed in order to provide more familiarization with research questions and targets. The underlying topics as overview of corporate earnings quality and financial reporting aim to build up the general understanding about the reality in the companies that tends to contradict with the factors to set the policy of the earnings management and manipulations. The explanatory mission of the subchapter ‘’Earnings management’’ consists of the main characteristics and factors of the earnings management affairs. The theory about the mathematical model – Beneish M-score emphasizes eventually the way, how to detect manipulators among the companies relying on the financial information derived from the financial annual reports.

## 2.1 Overview of earnings quality

Earnings quality has one of the most significant roles concerning financial reporting process. In details, high standards related to the quality of earnings tend to enhance capital market efficiency and literally improve the business collaborations. In general, shareholders, investors and other financial participants have a willing to obtain accurate and informative accounting data. Relying on this tendency, the devisers of the reporting standards are constantly trying to polish up the methods and benchmarks,

which enhance the earnings quality.

Deliberately, earnings perform as either a summary indicator or a premier component of the financial reporting package (Francis, Olson & Schipper 2006, 13). However, it is not sufficient to pay attention exclusively on earnings in case of analysis of the financial reporting quality. It is crucial to take into consideration other non-earnings components such as balance sheet information, which is literally is not explained in the ‘earnings’ definition but rather significant for particular decision- making practices. To summarize, high quality of financial reporting performs as a blend of various components that compose its importance concerning the capital market decisions and earnings quality features.

Information about the earnings quality strives to provide details about the corporate’s financial operations over decades of time. Outstandingly, the other influencing spheres of this data consist of detecting the modifications of accounting standards in various institutions; implementing the comparisons of financial figures and reporting techniques all over the globe, and investigation of the earnings quality nature and its impact on the cost of capital.

Unexpectedly, ‘’quality of earnings’’ does not have a specific and exact definition in academic and professional literatures. Regarding the interpretations of how investors and reporters evaluate earnings quality- consequently, diverse definitions of earnings quality appear on a constant manner. In spite of its vague meaning, several attempts to prescribe more acutance and theoretical solidification were made in the recent financial papers by various researches.

Independent standard-setting bodies such as International Accounting Standards Board (IASB) and Financial Accounting Standards Board (FASB) conclude in the framework-based understanding and teaching presentation concerning accounting standards, the main roles of the conceptual framework and, specifically, reporting policy. Despite the fact that the

earnings quality was not defined concretely in the draft, a consequence of significant characteristics is provided including relevance, faithful representation, comparability, verifiability, timelines, and understandability that assists to reach high quality in every aspect (IFRS, 2011):

- **Conservatism**- the quality of conservatively determined earnings is high because there is a small chance of overestimation in the scope of future developments and alterations.
- **Economic earnings** – earnings reflect the high quality characteristics in case of the accurate reflection of the change in the net asset because of earning activities.
- **Stability**- high-quality earnings exhibit low volatility over-time.
- **Predictability**- it is uncomplicated to make a forecast.
- **Relation to cash flows**- there is a relatively small percentage of accruals in high-quality earnings (Sloan 1996, 289-315).
- **Persistence (sustainability)** - the current level of earnings is a good proxy for the expected level of earnings in the near future, and it implies a relatively predictable level of volatility relying on the near forecast.

Despite the fact that all the descriptions above clarify the same statement ‘earnings quality’, all of them have the distinct nature comparing with each other, and sometimes have contradictory implications depending on the current financial tendencies and requirements.

To continue the reasoned disclosure of the earnings quality sphere, it is important to mention that because of the high interest to earnings quality from the participants of financial reporting procedure, accounting educators and researches, the factual evidence comprises several analyses implementing research on quality of earnings. Literally, the two contrary analytic techniques differ in benchmark construct, and observe the earnings quality from two different edges: (1) financial analysis perspective and (2) both decision usefulness perspective in accordance with Hicksian income

perspective.

Dechow and Schrand analyze quality of earnings from a financial analysis point of view, they suggest to take the view to deduce earnings quality as a reflection of how well earnings represent the current operating performance and value of the firm. In details, the high quality of earnings is met according to the following conditions: either when (1) the earnings number accurately annuities the inartistic value of the firm or when (2) return on equity is an accurate measure of the internal rate of return on the company's current portfolio of projects (Dechow & Schrand 2004, 1-152). Consequently, they identify that precise and high quality of earnings is achieved relying on the following attributes when it accurately reflects current performance, it forecasts future performance, and it proposes a useful summary about firm's value. Moreover, Dechow and Schrand solely rely on the rule that high quality earnings usually correspond to the Generally Accepted Accounting Principles. Principally, they are free of any form of fraud and earnings manipulation scope, and respectively illustrate a fair view of enterprise's financial performance.

On the contrary, in spite of the decision-usefulness purposes that coincide the Financial Accounting Standards Board's (FASB) conceptual framework, and from the economic definition of Hicksian income perspective, which proves the idea that accounting earnings should squarely reflect changes in wealth. Schipper and Vincent (2003, 98) concluded the evaluating analysis. More in details, it is stated that earnings quality is ''the extent to which reported earnings faithfully represent Hicksian income, where representational faithfulness means correspondence or agreement between a measure or description and the phenomenon that it purports to represent''. In this case, the dependence shows the quality of earnings relying on its correlation focus with the 'true earnings' that has no dependence on accounting standards and its proximate usage (Schipper & Vincent 2003, 98). ''True earnings'' is a neutral and context-free measure that is rather sophisticated to evaluate as Hicksian income is not

observable. Nevertheless, due to the fact that Hicksian earnings are not observable, the construct is not operational (Schipper & Vincent 2003, 96).

Logically continue, it is important to outline the main sources of earnings quality and distinguish between two of them. Commonly, the determinants of the earnings quality and its market capital outcomes are interconnected very closely. Familiarly, there are two main influencing factors on earnings quality: (1) those that reverse innate features of business models and (2) operating environments that reflect the financial reporting process per se (Francis, Olson, & Schipper 2006, 12).

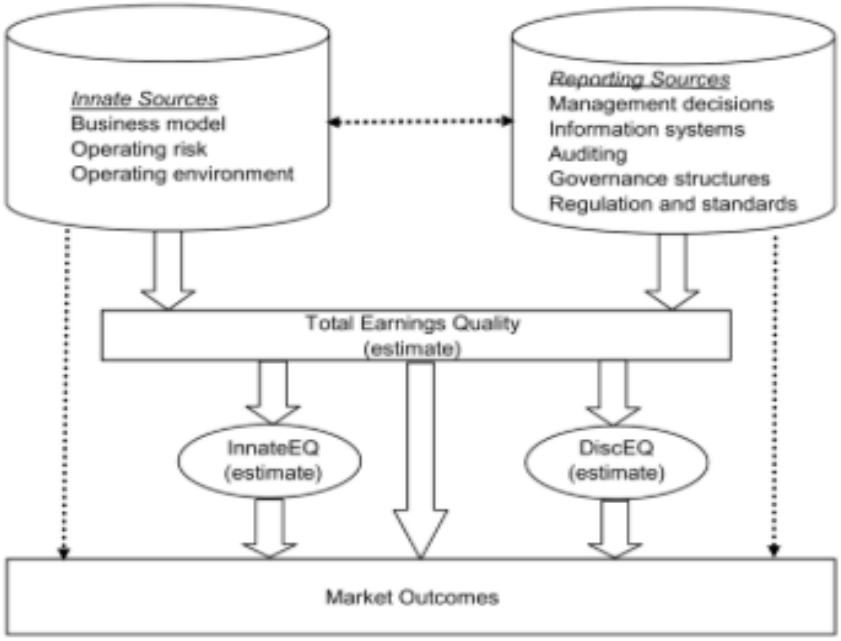



Figure 1. Schematic overview of the sources of earnings quality, their relation to the innate and discretionary components of earnings quality, and the overall links to market outcomes.

As it is possible to conclude from the Figure 1, innate sources comprise from the business models and operating environments; reporting sources arise from the financial reporting process that consist of (1) management's financial reporting decisions; (2) the quality of general condition of information systems used to support financial reporting; (3) monitoring activities including internal and external audit; (4) governance activities, including the practices and actions by shareholders; (5) regulatory standards that enforce to obey the law; (6) reporting standards such as generally accepted accounting principles (GAAP) (Francis, Olson & Schipper 2006,11). As a coincidence, there is an interconnection between the innate and reporting sources to have an impact on the general earnings quality, which respectively influences the market outcomes.

As far as the earnings quality is one of the main aspects in the accurate and sound financial reporting processes, the variety of the influencing determinants is needed to place under the specific attention. Therefore, the earnings quality could be characterized through the vast range of characteristics including conservatism, value-relevance, sustainability, earnings management, etc. In particular, the high quality earnings have lower level of earnings management and manipulation.

## 2.2 Financial reporting quality

It is common knowledge, that financial reporting takes a significant part in the corporate strategy. Generally speaking, it consists of the financial information about the business' performance over a specified period of time that is presented to the management board of the company and to the public, in case the company operates publicly. As a rule, financial reports are issued on a regular basis: quarterly and annually. Company's annual reports usually include financial statements. Financial reporting information plays a significant role concerning capital allocation and strategic targeting of the entity.

Financial reporting is a multi-step process with different participants, who use the outcome financial information for implementing judgments in various

fields including uncertainties about the potential risk, conditions for making investments. In other words, the quality of the financial reporting is at a high level of significance because it has the direct relation to the potential financial decisions. Financial reporting quality requires companies to expand the scope and quality of the reported information in order to facilitate greater transparency and to lower the asymmetry of the information. Consequently, the main purpose of the financial reporting information epitomizes a basis and supports the judgments and decisions on the capital market. Financial reporting quality is of a high interest because it leads to the high quality decisions and judgments to satisfy the needs of investors' and stakeholders. Moreover, the secondary purpose of the financial reporting quality comprises the criteria to evaluate the assigned tasks of the participants in information creation or dissemination, for instance, relying on the GAAP principles (Francis, Olsson, & Schipper 2006, 10).

For Jonas and Blanchet (2000,353-363), financial reporting is not only a final output; the quality of this process depends on numerous variables and components, including disclosure of the company's transactions, information about the selection and appliance of the accounting norms and standards and knowledge of the conducted judgments. Relying on the leading authorities' evaluation of the financial reports, the primary qualities required are relevance, reliability, transparency, and clarity (FASB, 2011).

Some researchers have discovered the main advantages about presenting a high quality reporting among the entities:

-financial reporting quality reduces information risk and liquidity (Lambert et al. 2007,385-420).

- financial reporting quality prevents the board of managers against using their discretionary power in spite of their own needs and interests, controversially, makes them to implement effective corporate and financial decisions (Chen et al., 2011).

According to Dechow et al. (2010,119), the main possibilities to evaluate the

financial reporting quality are: (1) earnings quality; (2) accounting conservatism; (3) accruals quality. Illustrating this theory, it was stated that ‘’higher earnings quality shows the features of the firm’s earnings process that are relevant to a specific decision made by a specific decision-maker’’. In other words, earnings quality performs as the core measure of the financial reporting quality.

Earnings quality is one of the most employed proxies of financial reporting quality in research about this concept. It is necessary to take into account that earnings quality is negatively associated with earnings management, which is considered to be the inverse of the financial reporting quality; a higher degree of earnings manipulation is associated with lower quality of information (Dechow and Dichev 2002, 35). Earnings management is used to distort the true performance of firms, and analysts behave as external monitors to managers. One of the managers’ incentives to carry out these unethical practices could be in order to increase the financial performance, which can only occur in the short term. Thus, in the long term, the market penalizes those manipulative companies, and they enjoy lower corporate performance (Rangan 1998, 105).

## 2.3 Earnings management

The term ‘earnings management'' includes a diverse variety of accounting techniques, which the managing board of the enterprise uses to achieve the desirable strategic and financial targets.

Retrospectively, there is no consensus concerning the definitive meaning of the term ‘’ earnings management’’. However, different researchers and financial participants tend to implement constant attempts to prescribe the meaning of the statement relying on the perspective that is more relevant to the condition of its operations and financial processes.

A lack of consensus concerning the precise meaning of earnings management implicates the different outcomes of the empirical studies of the practice that seeks to determine the earnings management scopes, or

provides the examples and factual evidence of the earnings management determinants' presence. Notice the plural: accounting researchers have adopted the variety of descriptions to reveal the nature of the term:

Managing earnings is ''the process of taking deliberate steps within the constraints of generally accepted accounting principles to bring about a desired level of reported earnings'' (Davidson, Stickey & Weil, 1987).

Managing earnings is ''a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to say, merely facilitating the neutral operation of the process)''. A minor extension of this definition would encompass ''real'' earnings management, accomplished by timing investment or financing decisions to alter reported earnings or some subset of it'' (Schipper 1989,92).

''Earnings management occurs when managers use judgments in financial reporting and in structuring transactions to alter financial reports in order to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers'' (Healy & Wahlen 1999, 365).

Due to the fact that it is possible to obtain financial information about the company through the diverse channels such as analysts research, business press, government statistics, but the financial reports, issued by the company, is the primary and the most reliable source of data. To support this fact, it is important to mention the statement from US GAAP. Financial reporting should provide information that is useful to assist potential investors and creditors and other users in accessing the amounts, timing, and uncertainty of prospective about the net cash inflows of the related enterprise (GAAP 2008, SFAC No.1, paragraph. 37). Relying on the financial information from the company's reports, it is sufficient to draw the related valuation of the enterprise's performance.

According to the tendency, accounting data arises the willingness to

manage earnings for various purposes in order to achieve strategic targets. It is important to mention the evidence of income increasing overstatements and earnings management:

(1) debt covenants- arise the incentive to increase earnings either to lower the restriction level of accounting-based constrains in debt agreements or to refuse the costs of covenant violations;
(2) compensation agreements- managers tend to alter the reporting earnings in order to increase the future compensations and profits;
(3) equity offerings- mainly security offerings and, in consequence, the asymmetric information between owners and investors arise the incentive to manage earnings;
(4) insider trading - managers of the entities with overstated earnings and with a small hint of earnings management that contradict GAAP, sell the shares more intensively especially in the time period than managers with the adequate policy concerning earnings quality (Beneish 2001,7).

Likewise, some managing boards of the company tend to use the financial data and, peculiarly, the reporting figures in the purposes to raise the awareness and to improve the perception about the company in front of the various collaborating groups. For instance, the investors tend to follow the tendency of smooth earnings and persistent patterns of increasing profits over volatile numbers over time (Dechow & Dichev 2002, 35-39). Moreover, the entities are inclined to apply earnings management in order to alter the perception of investors about the ‘’solid’’ earnings vs ‘’one time’’ item with the motivation to reduce perspective occurring expenses and costs. In emerging cases, the managing boards are forced to manage the earnings in the reporting papers in order to conceal the criminal conducts such as bribery, thefts, and fictitious transactions.

It is worth to mention the indicators of the earnings management. As far as the possibility to face, the earnings overstatement occurs in case of vagueness and subjectivity in Accounting Standards. Due to the recent diverse researches about this topic, several specific indicators of earnings

overstatement were detected.

The first peculiar characteristic is that earnings are just above an important benchmark. Under these circumstances, the probability of overstated earnings is higher when reported earnings are larger than zero, or a bit larger than previous accounting period earnings (Burgstahler & Dichev 1997,105).

Enlargement of capital. Resent financial researches specified whether the companies that trying to raise the capital have more intentions to overstate earnings.

High accruals. The financial information states that the earnings are equal to the cash flow processes and accruals. Despite the fact that both elements might be manipulated, the cash flow operations require the actions with ‘’non-fictional’’ transactions. On the contrary, accruals are calculated mostly using biased data and, consequently, more easily manipulated. That is why it is possible to conclude when the accrual quantity is relatively high; the chance of overstated earnings becomes more realistic (Sloan 1996, 289-315).

A change in accounting policy. Generally speaking, when the company intends to alter the accounting policies either to more conservative or to include more modifications and, hence, it becomes more aggressive. Therefore, during the changing period, the income demonstrates the cumulative effect of the changing processes.

Material related -party transactions. In case when the other transaction’s participant is dependent on its company or shareholders, the transaction price and other related costs might indicate unfair value. Therefore, the probably to manipulate earnings becomes higher from the transaction participant’s point of view.

It is worth to mention other types of earnings alterations, controversially to financial overstatement, namely, that demonstrate the understatement of

earnings. Unbalanced and unplanned earnings might provoke earnings understatement. In case of the extremely high earnings, management board might establish the reserves for the future accounting balances.

## 2.4 Beneish M-score Model

It is a common knowledge that financial manipulations and frauds cause huge losses for the enterprises. To lower the tendency of such a problem and to detect the level of company's creative accounting, Professor Messod Daniel Beneish has formulated a mathematical model to classify the firms into fraudulent reporters and non-fraudulent reporters. According to the fact that justifies companies involved in the accounting fraud, the M-score model helps to indicate the perspectives concerning the tendency to become a manipulator.

Professor Beneish has indicated the several characteristics concerning the firm's operation that might correspond to the characteristics of the typical earnings manipulator. A company-manipulator: (1) is growing extremely fast with extremely high year-after-year sales, (2) applies deteriorating fundamentals (as evidenced by a decline in asset quality, eroding profit margins, and increasing leverage), (3) adopts aggressive accounting practices (receivables growing much faster than sales; large income-inflating accruals; decreasing depreciation expense) (Beneish 1999,7). Based on this description, it is possible to conclude that the companies with these tendencies are rather risky for the potential investors in the future. The main reasons are that such enterprises might be overprices due to the intensive trajectory of high growth and they might represent the problematic characteristics, e.g. lower earnings quality. In other words, it is necessary to mention that such firms might disappoint investors hereafter. Therefore, M-score model assists potential investors to examine the likelihood for the future collaborations and to improve the reliability of investments.

Financial model is formulated as a set of analysis ratios and eight variables to identify the occurrence of financial fraud or intention to be involved in the earning manipulation practices. All the required data and variables are

constructed from the numbers, presented in the annual organizational statements and financial reports. Consequently, once computed, the model represents the M-score (in which ‘’M’’ stands for the earnings manipulation). Afterwards, M-score might be converted to the degree and probability, in which the companies tend to manipulate the earnings.

In this analysis model, the special formula for calculation of M-score is offered:

M= -4,84+0,92*DSRI+0,528*GMI+0,404*AQI+0,892*SGI+0,115*DEPI-0,172*SGAI+4,679*TATA- 0,327* LVGI, where

DSRI - Days’ Sales in Receivables Index
GMI- Gross Margin Index
AQI- Asset Quality Index
SGI- Sales Growth Index
DEPI- Depreciation Index
SGAI- Sales, General and Administrative Expenses Index
TATA- Total Accrual to total assets
LVGI- Leverage Index

In addition, all eight computing variables of Beneish model can be divided into manipulation group and motivation group, and were structured so that an increase in the variable means a higher probability of manipulation:

- **Manipulation signals are**: days sales in receivables index (DSRI) for revenue inflation; asset quality index (AQI*)* for expenditure capitalization; depreciation index (DEPI) for declining rate; and total accruals to total assets (TATA) for accounting not supported by cash.
- **Motivation signals are**: gross margin index (GMI) for deteriorating margins; sales growth index (SGI) for sustainability concerns; selling, general, and administrative index (SGAI) for decreasing efficiency; and Leverage index (LEVI) for tighter debt constraints.

According to the formula, the eight variables should be applied to compute

the calculation. The following ratios describe each variable of the formula respectively:

1. DSRI (Days' Sales in Receivables Index) = (Receivables Current Year/ Sales Current Year)/ (Receivables Prior Year/ Sales Prior Year)

DSRI ratio identifies the relation of days' sales in receivables to the net sales of the current year to the corresponding numbers of the previous reporting year. According to this variable, it is convenient to determine whether receivables and revenues are balanced or not in two consecutive years. A visible increase of days' sales in receivable might be caused by various reasons including changes in credit or financial policy, strategic alterations, and earnings manipulations.

2. GMI (Gross Margin Index) = [(Sales Prior Year-Cost of Goods Sold Prior Year)/Sales Prior Year]/ [(Sales Current Year-Cost of Goods Sold Current Year)/Sales Current Year]

GMI is a ratio of gross margin index of the previous year to the gross margin index of the corresponding year. As a fact, when GMI indicator is greater than 1, it is possible to suppose that gross margins have declined. Whether a business's ultimate goal is to raise its profit margins, the decline in gross profit margin might be a warning for the prospective firm's prospects. Consequently, the chance of the firm with higher level of negative perspectives increases the chance to start earnings' manipulations more intensively.

3. AQI (Asset Quality Index) = (Current Assets+ Property, Plant & Equipment)/ Total Assets

AQI is a ratio, which specifies the relation between the sum of current assets and non-current assets as property, plant and equipment to the total assets of the corresponding year to the numbers of the previous one. According to Siegel (1991), if AQI is greater than 1, it indicates that the firm

has potentially increased its involvement in cost deferral. Moreover, this ratio assists to evaluate the quality of the assets between two years. An increase in asset realization risk and lowering of the asset quality might be a clue for the detection of earnings manipulations.

4. SGI (Sales Growth Index) = Sales Current Year/ Sales Prior Year

SGI is a ratio of net sales of the reporting year to the number of the preceding one. It does not stand for that the accelerate growth of the enterprise might be an indicator of earnings manipulations. Nevertheless, developing companies are dependent more on the external finances than mature ones. The necessity of the external financial sources might raise the intention among managers to manipulate earnings and sales to achieve future targets and profits (Wahlen,J. M., Wahlen,S. P., Baginski,M. B., 2015, 465).

5. DEPI (Depreciation Index) = [Depreciation Previous Year/ (Depreciation+ PPE Previous Year)]/[ Depreciation Current Year/ (Depreciation+ PPE Current Year)]

DEPI is a ratio equals the relation of depreciation expenses of the previous year relative to the corresponding number of the current year. In case that ratio is greater than 1, the company has implemented the policy to expand the rate of depreciation by lengthening depreciable lives hence increasing the earnings (Wahlen,J. M., Wahlen,S. P., Baginski,M. B., 2015, 465).

6. SGAI (Sales, General and Administrative Expenses Index) = (Sales, General and Administrative Expenses Current Year/ Sales Current Year)/ (Sales, General and Administrative Expenses Prior Year/ Sales Prior Year)

SGAI is a ratio indicating the percentage of sales, general and administrative expenses from the net sales of the corresponding year to the same numbers of the preceding year. According to Wahlen et al. (2015, 465), if the index is greater than 1.0, it is possible that the marketing expenditures were increased to achieve the increased sales and profits in

the future. The companies that are not able to sustain the future sales growth and development, have the higher chances to be involved in the earnings manipulations.

7. TATA (Total Accrual to total assets) = (Net Income- Cash Flow from Operating Activities)/ Total Assets

TATA is a ratio that indicates the difference of income from continuing operations and cash flow from operations activities to the total accruals of the corresponding year. As a calculation outcome, it is sufficient to discover the number of total accruals between various firms across various periods. In Beneish model, this variable indicates the level how earnings result from accruals surpass the income from cash flows. Therefore, if the result is positive, accruals play a significant role in measuring income, and meanwhile, accruals might be assessed as means to manipulate the earnings.

8. LVGI (Leverage Index) = [(Long-term debt+ Current Liabilities Current Year)/ Total Assets Current Year]/ [(Long-term debt+ Current Liabilities Prior Year)/ Total Assets Prior Year]

LVGI is a ratio that equals relation of the number comprising of all the current financial liabilities and long-term debt to the total assets of the current year to the corresponding number of the previous year. The increase in the proportion of debt likely indicates the greater chance to violate debt covenants (Wahlen et al. 2015, 465). Consequently, the intention to fade out the violations increases the perspective to be involved in the earnings' manipulations for the company.

According to Beneish M-score Model, properly, for the analysis of the financial statement of a particular entity, at least two periods of reporting information to identify unusual tendencies are required. However, as reported by several recent financial researches, to identify the financial policy of the company, it is necessary to gather reporting information from

the five years respectively. Professor Beneish has concluded the following:

when M-Score is less than -2.22, the company is likely not earnings' manipulator,
when M-Score is equal or more than -2.22, the company is likely to be a manipulator.

As far as it was stated above, Beneish Model is a technique that might be used in accounting data, which has become more applicable among companies, investors, and scholars in the fields of finance and accounting during the last years. Clearly, it provides future researches with alternative techniques for fraud detection and helps in diminishing financial losses. Due to the wide usage, it is possible to consider all the strengths and weaknesses of the model that might be significant for the subsequent development and application of the technique.

Concerning the positive sides of the model, Beneish Model is a modern mathematical model that gained a widespread popularity in usage among corporate, academic and institutional worlds. Furthermore, it is reasonable presume that the results of the model are accurate, reasonable, and up-to-date. Secondly, the model considers financial information and, in particular, variables from the different perspectives, precisely related to both the detection and incentives for fraud. That is to say, this technique allows the users to observe the different edges of business performance in concert instead of isolation. It allows obtaining more accurate and profound data about the financial position of the entity. In addition, the model requires unsophisticated data, at least two years, that raises cost-effective benefits (Aris, Othman, Arif, Malek & Omar,2013).

Despite the plenty of visible advantages concerning the Beneish Model, the technique is rather far from being perfect due to the several drawbacks. First and foremost, the model is based on the study of obsolete data and it has a high percentage of the classification errors. As a result, there is a lower chance to gain the precise evaluation of the financial performance of

the company because of the fact that Beneish Model is partly backward looking. Second, taking into consideration the fact that model relies on the financial information from the annual reports of publicly traded companies, it is acceptable that such a method would not be appropriate for studying the privately-held companies (Aris, Othman, Arif, Malek & Omar,2013).

It is crucial to mention that Beneish M-Score Model does not present the ideal evaluation for manipulation among the companies. That is why of the significant importance, it is crucial to detect the level of the accuracy about the manipulation level within the company based on the model.

# 3. Empirical Literature Review and Hypotheses Development

In fact, logically planned literature review takes a significant place in the whole process of formulating the research problem. Generally speaking, the literature review can have a significant impact on the profound understanding and conceptualization of the research questions. Furthermore, it also assists to gain the most precise and sound research results. First and foremost, literature review helps to tie the research problem and the particular body of knowledge in the area of interest. Consequently, it is possible to understand the research questions from the clearer perspective and to make the theoretical justification of studies. Second, the empirical review presents the relation of the previous methodologies and studies with the current research. In other words, it is of easier opportunity to select the most applicable methods and, in consequence, derive valid and up-to-date research results. Last but not least, the empirical literature review raises the awareness about the research topic in the subject area and familiarizes with the recent studies of other researchers and academics (Kumar 1999, 26). In other words, the empirical literature review possesses high significance related to the research process, and increases chances to obtain specific and valid research outcomes.

Thereupon, after conducting the literature and empirical reviews, the next step of the research process arises the need of constructing hypothesis that will be researched in the study. As a rule, hypotheses bring more clarity, specificity, and focus to a research problem. Kerlinger (1986, 17) defines a hypothesis as a testable preposition about the relationships between two or more variables. Black and Champion (1976, 126) delineate hypothesis as conjectural statement about a specific topic the soundness of which is not proved. Despite the fact that hypothesis is not mandatory part of the research, it brings more objectivity and explicit focus to the research process.

It is common knowledge that it is of a sophisticated target to describe and to predict the types of all the potential companies that might experience manipulation of financial statements to commit earnings' overstatement. As far as Beneish M-score model is rather modern mathematical technique for detection of earnings' manipulation among businesses, it was rather often examined and sophisticated by scholars all over the globe whether the model is empirically valid and sufficient. This section briefly discusses some of the key findings interconnected with Beneish M-Score Model, though there is no attempt to provide with the whole explanation of characteristics concerning the manipulated companies.

Beneish conducted the outstanding pioneering paper about the manipulating companies in 1999. The professor tested out the model and implemented the research concerning the companies that were included in Copmustat database in the period of 1982-1992. In addition, Beneish also created the model that defines the straightforward relationship between the likelihood of manipulations and selected financial statement data. Moreover, this technique was defined as a cost-effective tool. The main outcomes of the studies displayed that Beneish's weighted and unweight contingencies of earning manipulations are systematically correlated with the presence of fraud. In details, Beneish identified that it is possible to determine 76% manipulators, whilst only incorrectly detect 17,5 % of non-

manipulators.

Beneish (1997) obtained a sample of 49 companies that contravened the GAAP principles. In addition, the sample of 15 companies, whose accounting policy was under suspicions by the news media between 1987 and 1993, was involved in the analysis. Both sets of enterprises are identified as the manipulators sample. Moreover, the professor intended to set up a sample of the companies with specifically ‘aggressive accruals’ relying on the Jones model. The main objective of the study was to distinguish the real manipulators from those companies with high percentage of accruals and aggressive application of the GAAP. As a consequence, Beneish concluded that accruals, day's sales in receivables and prior performance are crucially important for the future explanation between two groups. Beneish trialed the sample of manipulators to 2,332 Compustat database controlled by the industry and the year for which the financial statement data, used in the model, was available. For seven of the eight financial statement ratios the appropriate index and calculation were prescribed. As higher the index of the ratio, then there is a higher probability of earnings manipulations. Beneish concluded that the days' sales in receivables index, gross margin index, asset quality index, sales growth index, and accruals are irreplaceable for the analysis process.

Most of the recent researches support Beneish Model and expand this theory with some additional proxies and variables.

Dechow et al. (1996) analyzed 436 companies released between April 1982 and December 1992. Their final sample after deep analyses and eliminations included 92 companies. The concept was that each company was matched in the year prior to manipulation to a control company in the same industry and with similar asset values. There was evidence provided that during manipulation period, the accruals were preliminary high. However, the focus was to show that various corporate governance factors appear to be correlated with manipulation. For instance, the researchers detected that manipulating companies have a high number of insiders on

the board and a CEO, who is more powerful and entrenched.

Wright (2006) analyzed 86 manipulative companies matched by industry and sales, focusing on the corporate government variables. It was detected that manipulators tend to have managers with higher stockholdings (more than five percent), have less virtual audit committees, have more powerful and influencing board of the CEOs and tend to have recently switched auditors.

Richardson et al. (2002) inspected 255 companies that restated earnings between 1971 and 2000 and matched up them to 133208 non-restating companies. They did not pay attention to restatements caused by changes in FASB accounting rules, stock splits, merger and acquisitions. They tested for differences in means of the restating company relative to non-restating company and identified that restating companies have lower earnings to price and book to market ratios, raise more financing, and have larger total accruals. Additionally, they also found out that restating companies have longer consecutive conditions for growth. They suggested that capital market pressures are likely to be a motivating factor for earnings management that results in restatements.

Bayley (2007) implemented an analysis of 129 companies relying on the following criteria: industry, company size, and time period. It was concluded that total accruals are more sufficient than various measures of unexpected accruals in terms of the detection the material accounting manipulations. In addition, in the study the researchers came up with an idea that other financial ratios are more useful and powerful. It was suggested that holders of the future earnings research should give up the usage of the discretionary accrual models and instead consider supplementing accruals with other financial statement ratios.

In spite of the fact that in several studies the data applied in Beneish Model was not adequate to evaluate the overall financial situation, particularly, earning manipulation among companies on the market, some additional

variables were added to expand the research technique. Taking into consideration that Beneish Model in most empirical tests performed successfully, it is worth to conduct that the accomplishments of the model are generally sufficient in the field of interest. Furthermore, whereas stationing of the model in the finance and accounting area over the decades, the theory is mostly accepted and commonly used by the financial market participants.

In consequence, the hypothesis states that Beneish M-Score model accurately reflects the tendencies of earning manipulation among the sample companies. In other words, the financial variables presented in Beneish M-score model are genuine and decent determinants of earnings' overstatement. The pioneer hypothesis is followed by the two sub-hypotheses that specify the tendency on German and Finnish markets separately.

H1: The financial variables described in M-Score Model are positively correlated with the likelihood of earnings manipulations on the full sample of Finnish and German companies.
H1a: The financial variables described in M-Score Model are positively correlated with the likelihood of earnings manipulations on the full sample of Finnish companies.
H1b: The financial variables described in M-Score Model are positively correlated with the likelihood of earnings manipulations on the full sample of German companies.

# 4. Methodology

This chapter explains the methods used in completing and analysis of the study, delivering a special emphasis on the data analysis. It should be noted at the outset that the methodology to a certain extent was a deriving one, which took explicit shape as the study progressed. The reader will be introduced to the process, which was implemented to collect the necessary set of data in the field of interest, and to the process of analyzing and

defining the research outcomes.

According to Joyner (2013, 229), research methodology clarifies the wide philosophical underpinning of a particular set of research methods. In more details, methodology is a specific technique that helps to resolve research questions in a logical order with a consistence scientific background. Therefore, research methodology and distinct research methods are crucial for the successful outcomes of the study.

Saunders, Lewis and Thornhill (2009, 108) define the whole research process as the research ‘’onion’’, which possesses various important layers before proceeding to the step of data collection and data analysis. The fundamental layer, that performs an irreplaceable role in the research methodology, is the research philosophy. The authors define research philosophy as the continuing development of knowledge in the particular field and its nature related to the research (ibid.,107). As far as the philosophy reflects the overall perception of the research strategy and methods, hence, it is of a high importance to choose the accurate type of philosophical position. Relying on this study the philosophy of positivism was chosen in order that it corresponds to the nature of the research targets. Positivism might be described as the view where only authentic knowledge is scientific knowledge that might be gained only through the positive affirmation of theories relying on strict scientific methods (ibid., 598). Furthermore, philosophy of positivism remains the researcher objective, independent and externally oriented that ties strictly with the research principles of this thesis. Positivistic philosophy demands highly structured data samples, which are the most propitiate layout for the quantitative analysis in perspective (ibid., 119).

In spite of the preferred positivistic philosophy in this research paper, the commensurate research approach was applied. In particular, the deduction approach owes more to positivism and, in general, to scientific research. Such approach is mainly based on the development of hypotheses and research design to test the hypothesis (Saunders, Lewis and Thornhill 2009,

124). In other words, when a deductive approach is being followed in the research, the author formulates a set of hypotheses that need to be tested. Then, through implementation of relevant methodology, the study is going to prove formulated hypotheses right or wrong.

## 4.1 Research Design, Strategy, and Purpose

It makes sense to state that research design is a general outline of how to resolve the research questions. Indeed, it should reflect the main objectives of the research studies, specify the data sources for information' collection, and acknowledge the credible working constrictions. Kerlinger (1986, 279) explains research design as: ''a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. The plan is the complete scheme or program of the research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of data''. In other words, the main functions of the research design relate to formalize and to logistically allocate the data in order to undertake the study, and relatively prove the validity, objectivity, and accuracy of the studying modes.

According to Saunders, Lewis, and Thornhill (2009, 139), the research purposes might be classified as exploratory, explanatory, and descriptive. As far as each type of the research purposes might assist to gain accurate information, the most appropriate should be chosen according to the research targets. Despite the approach method, the research purpose might be inconstant and change over the research studies depending on the purpose of the enquiry. When the researcher applies exploratory study, it is aimed to '' find out what is happening; to seek new insights; to ask questions, and to assess phenomena in a new light'' (Robson 2002, 59). Explanatory study is used when it is of a high importance to relate and to describe the relationship between variables (Saunders, Lewis, and Thornhill 2009, 140). In addition, the main object of the descriptive research might be described as '' to portray an accurate profile of persons, events or situations (Robson 2002, 59). Generally speaking, the explanatory purpose is used in

the current studies. In the thesis, the research problem investigates the level of significance between related variables comprising the formula.

In order to sustain the accurate research strategy, the main nature of the studies, quantitative or qualitative research, should be distinguished. Qualitative approach conducts the research with a non-numerical set of data and significantly suits to exploratory purposes. On the contrary, quantitative approach deals in most cases with numbers and numerical analysis with an aim to prove or reject a particular theory. Quantitative research explores the relationships between variables with the implementation of various statistical methods (Saunders, Lewis, & Thornhill 2012, 162). The existence of both qualitative and quantitative methods in one research suggests the usage of the mixed research method. Johnson, Onwuegbuzie, and Turner (2007, 123) defined the term “mixed-methods” as ‘’Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration’’.

Relying on the information above, firstly, the quantitative approach was used in order to gather information and respond to the question, which characteristics define the high earnings quality. Furthermore, the quantitative approach was applied for this thesis due to the possibility to explore, to test the scientific theories numerically, and to detect the relationship between the variables. Moreover, the applied data for the analysis was in numerical terms that are aimed to obtain profound findings about the research questions.

In the current thesis, the purpose of the study aims to detect the overall earning manipulation level on both Finnish and German markets; to identify whether the Beneish M-score model and its variables are capable to detect the earnings manipulation tendencies; to describe the principles of the sound environment and characteristics of the high earnings and reporting

quality. In more details, the purpose of this study involves to find out the positive relationship between the likelihood of earnings manipulations and variables of Beneish M-score Model.

## 4.2 Methods of data collection

Concerning the current research, only information from the secondary data was investigated to conduct the research questions and to find out the pioneering purposes of the study. Saunders, Lewis and Thornhill (2009,600) explain the secondary data as the data that have been already collected by and readily available from the other sources. In fact, secondary data serves as the data, which was compiled for some other purposes in recent studies. It is a matter of detective work to find out the appropriate set of secondary data to answer the research questions. This might evolve the researcher into the sophisticated process complying whether to detect the sort of required data is likely available; how to allocate the precise information (ibid.,280). In other words, secondary data might be a subject to rely on to generate the primary data in the research studies.

If to analogize the current study, the secondary data sources were used in the theoretical part of the research to expose the research problems and to become knowledgeable about the research purposes. The basic source of the secondary data was the academic and scientific reading. Where through, the topic of the research is based on the contemporary Beneish M-score model, this mathematical theory was not extensively covered in the books. Therefore, the theory was delicately investigated from the different perspectives relying on the vast set of different scientific and mathematical researches and publications. The subsequent outcome was the opportunity to gain precise, relevant, and contemporary data. The next step of the research, empirical studies allowed to analyze and to bolster recent researches in the field of accounting. Empirical studies were mainly conducted from the finance and accounting journals, appropriate scientific papers, and reports. The applied research theories and papers are commonly noted due to the fact that they brought an irreplaceable

development of theories to corporate earnings manipulations and fraud detection.

The financial information of the companies was also obtained from the secondary sources, financial statements from 2008-2014 years respectively. The author of this thesis implies the subsequent financial data as reliable and precise because financial statement is the official form of representing the numeric corporate data. A transparent and sound financial reporting is based on the Generally Accepted Accounting Principles (GAAP), and is persecuted under the law. The numeric data was mainly used to evaluate the financial performance of the companies and overall markets. The financial statements were subsequently extradited from the reports of Finnish and German companies.

In the terms of Finnish market, a full list of publicly traded companies was found at the Nasdaq OMX Nordics website. Nasdaq, Inc. is the leading world's exchange company. Nasdaq Nordic describes the common offering, public and exchange technology, and company's services from Nasdaq exchanges in Baltic Countries, respectively in Helsinki. This website contains information concerning the publicly traded companies in Finland. The time frame used for the analysis is the seven-year period from 1st of January 2008 until 31st of December 2014. The list of the appropriate Finnish companies was extracted according to the following criteria: companies from non-financial sector; the functional currency- Euro (European Monetary Unit).

In the terms of German market, a full list of publicly traded companies was found at the Frankfurt Stock Exchange website. Frankfurt Stock Exchange provides information for investors. The list of the appropriate German companies was extracted according to the following criteria: Prime Standard. In more details, the following requirements are prescribed for the Frankfurt Stock Exchange Prime Standard listing companies:

- Minimum age of company—3 years (exemptions possible);

- Minimum issuing volume—minimum market capitalization of €1.25 million;
- Minimum 30 shareholders;
- Free float minimum of 25%;
- Equity capital minimum of €1.25 million (cash at some time in past or present);
- Nominal issuing volume minimum of 10,000 shares;
- EU approved prospectus (underwritten by company + bank/FWB-member);
- 3 years audited financials—IAS/IFRS (or adequate for Non-EU issuers);
- Estimated Time to Listing—Approximately 6 to 8 months.

According to Kervin (1999), there also exists another type of secondary data, which can be refered to as complied data. This type represents data, which has already gone through some kind of processing, or summarising. In this thesis complied data represents information extracted from companies' financial statements: income statement, balance sheet, and cash flow statement. The finanical statements were accessed on the companies' websites and presented official information concerning business activities of firms. These financial statements allow to determine and to calculate the accounting variables, which are used in assessing Beneish M-score Model. This secondary data was manually written for each company separately on a yearly basis throughout the six-year period. The data withdrawn from the financial statements of both Finnish and German companies includes: Net Sales, Cost of goods sold (COGS), Net Receivables, Current Assets, Property, plant and equipment (PPE), Depreciation, Total assets, SGA Expenses, Net Income, Cash flow from Operating Activities, Current Liabilities, and Long-term debt.

In order to assess the eight variables, the following financial indexes are crucial for the calculation of the main formula:

Net Sales is the gross inflow of economic benefits (cash, receivables, other

assets) arising from the ordinary operating activities of an entity such as sales of goods, sales of services, interests, royalties, and dividends minus the value of product returns and allowances. Allowances are price reductions or rebates offered to customers to persuade them to keep an item rather than return it (Webster 2004,52).

Cost of goods sold (COGS) is the amount of direct costs related to the production process of goods. COGS include the price of materials used in the production and the direct labor costs (Eliott 2009,189). In other words, COGS represents the total amount of direct costs tied to the production process.

Net receivables are the remaining amount after the subtraction of money owed that is likely to be never paid from the total money owed to a company by its customers. The main purposes of net receivables are to evaluate the entity's effectiveness of a collection process and to predict the cash forecasts.

Current assets represent assets that will be sold, used up, or turned into cash within the current accounting period, mostly one year. The most conceivable examples consist of cash, accounts receivable, supplies, and merchandise inventory (Webster 2004,31).

Property, plant and equipment (PPE) is a tangible company's assets that is vital to business operations and cannot be easily liquidated. It is held by the entity for the use in production or supply chain of goods and services, for rental, and administrative needs. Moreover, the expected period of usage exceeds one period (IAS 16,2003).

Depreciation is the systematic allocation of the depreciable amount of an asset over its useful life as a result of usage, the passage of time, or obsolescence (Eliott 2009, 29). Depreciation records the loss of value only of the tangible assets, such as property and machinery. From the other edge, depreciation might represent the decrease in and asset's value

caused by unfavorable market conditions.

Total assets are the valuable resources that belong to the company's ownership and control. They consist of the potential future economic benefits and arise as the outcome of past transactions. The typical examples of assets include cash, accounts receivable, equipment, land, and investments (Eliott 2009, 28). Otherwise stated, assets are the items that might be converted into cash. Total assets are the sum of tangible and intangible assets.

SGA Expenses is the total price of all direct and indirect selling expenses and all general and administrative expenses of a company. Direct selling expenses are directly tied to the selling process. Controversially, indirect costs include all expenses that are not connected with the straight selling process, but proportionally allocated to all units sold during a certain period.

Net Income expresses represent the amount of money remaining after all operating expenses, interest, taxes and preferred stock dividends have been deducted from a company's total revenue. This measurement is one of the key indicators of company profitability and general performance.

Cash flow from Operating Activities is an accounting tool that represents the potential money that the entity brings in from ongoing, regular business activities, such as manufacturing and selling goods or services. Additionally, cash flow from operating activities does not include long-term capital or investment costs. Moreover, with the help of this index, it is possible to get deeper understanding of company's financial policy concerning short-term capital.

Current liabilities are the items falling due for payment within one year of the balance sheet data (Stittle & Wearing 2008, 157). In general, current liabilities include short-term debt, accounts payable, accrued liabilities and other debts.

Long-term debt is a money-related obligation owed by an entity to an external party financing the business. Long-term debt is frequently used to refer to the long term borrowings, usually more than one accounting year, such as long-term loan of a business (Stittle & Wearing 2008, 157).

## 4.3 Sampling

In spite of the fact that issues of sample selection have a great impact on the subsequent research analysis, respective results, and the most applicable form of hypothesis testing. In fact, despite of the preliminary research question and purposes, it is impossible to collect completely applicable information related to the topic due to the time, money and access restrictions. In such a case, sampling techniques provide a range of methods that enable to narrow the amount of data to collect by prescribing only data from the particular cases and elements (Saunders and colleagues, 2009, 212). Kumar (1999, 148) specifies sampling as detecting a few representatives (a sample) from a bigger group (the sampling population) to perform as the pioneering background for evaluating or implementing a forecast concerning information related to the bigger group. Saunders and colleagues (2009, 212) state that the full set of cases from which the necessary information was derived called ‘’population’’, in other words, the word is not used with its primary meaning; the full set of cases should not be people.

In order to refresh the primary topic of the thesis sounds as to compare the earnings management level among the Finnish and German Companies. Consequently, in the current studies, the term ‘’ total population’’ defines the total number of publicly listed companies on Finnish and German markets respectively. The original population of listed companies derived from Nasdaq Nordic was 137, and the total population of Prime -Standard German based companies was 318. A combination of the sampling techniques was applied in order to identify the required sample example that aims to answer the research questions. Generally speaking, in the current studies the combination of random sampling and non-random

sampling designs were applied.

According to the initial sampling stage, the disproportionate stratified random sampling was implemented. Kumar (1999, 158) defines stratified sampling as based on the logical prescription. In the study, the researcher follows the stratified random sampling in order to allocate the total population according to the particular characteristics into separated strata, where the preliminary size of the strata is not clarified. This sampling method allows greater level of accuracy and higher chance to gain precise data in consequence. In the wave of this research, both Finnish and German entities were divided into the financial and non-financial subsections owing to estimate the proportion of the non-financial companies from the ‘’total population'' number. Therefore, financial units were counted out from the list due to the inconsistency of information to apply the mathematical calculations of earnings management. Therefore, the total number of sample after the elimination of financial entities was diminished to 71 Finnish and 265 German companies.

At the second stage of the sampling process, the researcher conducted the non-probability sampling design. Saunders and colleagues (2009, 596) define this type of sampling as a method of sampling technique where the contingency or probability of each case being preferred is unclear. The accidental sampling was implemented due to the consistency with the nature of the research. Furthermore, no characteristics or quotas were launched in order to narrow down the research. Relying on the fact that the core principle of the thesis is Beneish M-score Model and in order to derive the model, the preliminary set of financial data should be acquired from the financial statements. Due to the fact that some companied on both markets did not possess the required set of financial indexes or the original language was differing from English, all such enterprises were excluded from the list. In a consequence, the potential samples were shortlisted to 60 Finnish and 60 German companies. The total population includes 120 companies on both markets.

It is considered that the multi-stage of sampling assists a researcher to overview the potential companies from various business perspectives in order to make a consistent choice of the firms with applicable and sound data for the research. Thus, the eventual result of the sampling process allows gaining a comprehensive data sample to contribute trustworthy research results.

## 4.4 Analysis methods

In the current research, the detailed analysis was implemented of all acquired data set with the help of the predictive analytics software called SPSS (Statistical Package for the Social Sciences). This data management and analysis product is commonly used for the various purposes including statistical analysis and reporting; forecasting modeling and data mining; big data analytics (IBM Website). Among its most significant features are modules for statistical analysis data, including descriptive statistics such a plots, frequencies, charts, and lists, as well as complicated inferential and multivariate statistical procedures such as categorical data analysis. SPSS is notably well suited to the quantitative analysis and theories' testing due to the wide range of related analytic tools to apply; accessibility, and conceivable background.

On the first stage of data analysis, the whole database was allocated in the scattered spreadsheets sorting out by the year and the market in the EXCEL software. Thereafter, the whole dataset was inspected and the corresponding calculations were conducted in order to derive the variable indexes for the M-score formula. On the next stage, independent and dependent variables were prescribed for the respective statistical analysis. Andy Field (2009, 7) explained independent variable as a one that stands alone and cannot be changed by the other variables, usually caused by some effect. The dependent variable is a one that alters appropriately to the changes of the independent variables, usually is considered as an outcome.

Clearly, for the Beneish M-score model, the M-score index is a dependent variable, and Days' Sales in Receivable Index (DSRI); Gross Margin Index (GMI); Asset Quality Index (AQI); Sales Growth Index (SGI); Depreciation Index (DEPI); Sales, General and Administrative Expenses Index (SGAI); Total Accrual to Total Assets (TATA); Leverage Index (LVGI) are accordingly independent variables. That is to mention, the researcher explores the extent how the changes in the independent variables influence the M-score index. According to the stated information, the author implements both descriptive and inferential analysis in the current studies.

Descriptive statistics and histograms are a good way of obtaining a precise representation of the data distribution. The term ''descriptive statistics'' is prescribed to the analysis of raw data that helps to describe, present or conclude the data in a meaningful and less sophisticated way. Descriptive statistics ensures a deeper understanding of the applied database and, in particular, the variables of the statistical analysis.

In terms of SPSS, descriptive statistics produces a table of means and standard deviations for the data spreadsheets. In other words, it is possible to derive from descriptive tables the following information: the number of valid observations; maximum value; minimum value; mean and standard deviation. In fact, maximum and minimum values represent the largest and smallest indexes among all the variables. Mean is the average value coined by adding up the values of each case for a variable and dividing by the total number of cases (Saunders 2007, 595). Alternatively, it is called as an average of the whole set of variables. Standard deviation assesses the dispersion of a set of observations from its mean; more spread-apart data has a higher level of deviation. If to reflex in details the outlook of the descriptive table, the variables are allocated in the rows, and the descriptives are organized in the tables. The output of the descriptive statistics analysis visualizes the information in the table that is easier to understand and to interpret.

Concerning the inferential research, the correlational analysis was implemented. According to Kumar (1999, 9), the main insistence in a correlational research is to detect or to create the existence of a relationship or interdependence between two or more variables. The correlation analysis will be arranged in the current research in numerical terms. What is more, the term Pearson's correlational coefficient takes a significant part in correlation research. In fact, Pearson's correlation coefficient (r) is a measure of the strength of the relationship between the two variables. The correlation coefficient should not be calculated if the relationship is not linear.

Pearson's correlation coefficient (r) for continuous data ranges from -1 to +1:

- r = -1, data lies on a perfect straight line with a negative slope
- r = 0, no linear relationship between the variables
- r = +1, data lies on a perfect straight line with a positive slope

Positive correlation represents that both variables increase or decrease together, whereas negative correlation represents that as one variable increases, so the other goes other way round, and vice versa.

## 4.5 Validity and reliability

As stated above, the rational and well-planned research design plays a significant role in the precise research findings. Therefore, in order to reduce the probability to gain the wrong research answers, it is of a high significance to pay attention on the two particular emphases of the research design: validity and reliability. Raimond (1993,55) conducts that …''scientific methodology needs to be seen from what it truly is, a way of preventing me from deceiving myself in regard to my creatively formed subjective hunches which have developed out of the relationship between me and my material''.

Generally speaking, validity controls whether the entire experimental concept and the obtained results meet all of the requirements of the scientific research method. Babbie (1990, 133) states that '' validity refers to

the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration''. That is to say that validity oversights the appropriate and accuracy criteria of the study to endure it credible. There exist different types of validity: face and content; concurrent and predictive; construct validity (Kumar 1999, 138).

In terms of this thesis, content and construct types of validity were examined. Content validity is a rational validity that mostly assigns an estimate of the degree how accurately an experiment represents what is trying to measure initially. The content validity represents the correctness and sophistication of the measure. Content validity is based on the statistics approach to be regarded as a strong type of validity (ibid., 138). The construct validity is a more sophisticated technique to measure the validity that is based on statistical procedures. It mostly accords with the matters of establishing the contribution of each construct to the total variation of the studying phenomena (ibid., 139).

In the current studies, several approaches were fulfilled in order to increase and to solidify the validity. First and foremost, the sampling method was used in the research process to increase the external validity. According to Saunders and colleagues (2009, 158), external validity states the extent to which the research results might be generalized to the broad population. Relying on the sampling methods, it was possible to conduct the representative sample, which exposes the ''total'' population. Therefore, the specified list of Finnish and German companies included the entities from various business sectors, except financial category, hence, making the enforced sample to endure persistent and capitulatory. Sampling method prescribed the logical choice of representative sampling to strengthen the intention to generalize the current studying across all companies. Second, to expand the time period of examined data and to make the current studies relatively well-grounded, it was concluded to handle a six-year research period. This approach assists to yield the valid and time-reasoned data. Third, in order to make the thesis relatively sound and justified, the analysis

of the recent scientific studies took a significant part in the research process. That is to say, to boost the valid basis of the research, the exemplary plan was designed in order to repeat the studying mode.

In a relation to reliability, the research should be consistent and state, and, hence, predictable and reliable (Kumar 1999, 140). In order to overlap the presumable researcher errors and inconsistency of the measurement, it was decided to implement a well-planned and highly structured data collection and to follow the strict outline of research process inspired by the empirical data collection. Insofar as the applied data was conducted in the numerical measures derived from the secondary data sources, the level of the objective researchers' interventions is minimal. In contemplation of fading time errors, the research data was collected on an annual basis of seven years from the financial reports of respective companies.

# 5. Research results

The following subchapters present the results of the precise analysis of the German and Finnish markets based upon the earnings manipulation detection and Beneish M-score model. The following outcomes are divided according to the categories of analysis, such as descriptive statistics and inferential correlation analysis.

## 5.1 Descriptive statistics

In fact, descriptive statistics provides with an opportunity to summarize the descriptive coefficients of a database that might be helpful in the analysis of the entire ''population'' or a particular data sample. Furthermore, descriptive statistics allows observing data from a more meaningful point of view, using a combination of tabulated descriptions, graphical description and statistical commentary. Consequently, it is crucial to conduct the descriptive overview of the main basic features of the data set.

In the current thesis, the researcher applied the two types of the descriptive statistics including measures of central tendency such as mean, median,

mode, and measures of variability including the standard deviation. Relying on this fact, the descriptive statistics was analyzed for the two samples of data: analysis of descriptive statistics of the Finnish market, analysis of descriptive statistics of the German market. The variables of the descriptive statistics analysis are represented in the following way: Days' Sales in Receivable Index (DSRI); Gross Margin Index (GMI); Asset Quality Index (AQI); Sales Growth Index (SGI); Depreciation Index (DEPI); Sales, General and Administrative Expenses Index (SGAI); Total Accrual to Total Assets (TATA); Leverage Index (LVGI), M-score.

With regards to the dataset of the Finnish market, there are several ways to examine the data patterns either relying on the tabular or the graphical of descriptive statistics. The analysis includes observations of six-year term for both Finnish and German markets. It is possible to find out the nature of the whole set of variables from Appendices 1-7. Referring to the graphical visual representations of information that are rather uncomplicated and clear, the overall situation about each variable might be described respectively (see Appendices 15-23).

Referring to the Appendix 8, the nature of the DSRI variable is depicted. Throughout six-year period of observations, the minimum indexes were quite stable with a slight rise in 2011, 2013 and a substantial fall in a subsequent year. The mean of the days in sales receivables remained stable without any sudden alterations. Standard deviation had a slight raise in 2010 but in the remaining years it was stable. The maximum indexes had substantial fall during the whole period but with a drastic increase in 2010.

With the help of descriptive statistics, the GMI variable might be illustrated as the following: standard deviation and mean were quite constant with a marginal fall in 2010 and a slight rise in 2013. Controversially, a maximum curve had a sharp decrease in 2011, 2010 years, and changed its direction dramatically in 2013 as a significant rise. Minimums were fluctuating permanently with spectacular falls in 2011, 2012 and subsequent rises in the remaining years.

Asset quality index does not disperse dramatically during the six year period. Standard deviation, minimum, and mean numbers had slight changes in 2010 and 2011, meanwhile, maximum of the variable altered several times, soaring in 2010 and 2014 (see Appendix 17).

Variable corresponding to the sales growth index has an overall conformability between standard deviation and mean. The maximum of SGI variable has a marginal rise in 2012, while minimum remains consistent in general.

Comparing with the described-above variables of the descriptive statistics, DEPI has some similarities concerning the tendencies of standard deviation, mean, and minimum values. However, the maximum values volatile over the years, with the respective modifications: sudden increases in 2010 and 2013 years; steady falls in 2011 and 2012 respectively.

Regarding Sales, General and Administrative Expenses Index the maximum values reflect spectacular fluctuations during the period of analysis. The common trend of the above variables follows the SGA Index concerning the standard deviation, mean and minimum figures related that the values do not present the significant changes and remain without dramatic movement over the whole period.

According to the Appendix 22, TATA Index does not reflect drastic modifications. All the figures remain durable, standard deviation and mean are in the corresponding stable tendency. LEVI supports the same tendencies concerning the stable condition of figures. Notwithstanding, the maximum indicators follow the tendency of downward moving over the years.

Consequently, relying on the graphical descriptive analysis, the M-score indexes might be inspected from the reasoned perspectives. Due to the fact that the overall tendency among the mean numbers and standard deviation of variables remain permanent M-score mean and standard deviation do not

follow the tendency of steady modifications. The maximum and minimum figures keep staying volatile when the periods of growing were counterfeited by the steady falls.

With regards to the dataset of the German market, the descriptive statistics is well explained and visualized with the help of tables and graphics too. It is possible to observe the similarities of the German-based companies with the tendencies in the Finnish market. The analysis of the variables is held in the same order as it was conducted with the Finnish market. First and foremost, the main information about descriptive statistics is represented in the tabular form derived from the descriptive statistics analysis (Appendices 8-15). Nevertheless, relying on the graphical visualization, it is more uncomplicated to fulfill the overall analysis of variables.

In order to describe the DSRI variable, it is worth to mention that minimum, standard deviation and mean indicators among German companies remain stable and do not follow the tendency of unbalanced movements over the years. Though, maximum figures have a dramatic rise in 2012 and the subsequent steady fall in the following years.

Regarding the GMI Index, there is a possibility to conduct the resemblance with the previous index DSRI due to the drastic changes in 2012. The same as Days in Sales Receivables, GMI maximum indicator has the spectacle shift upwards in 2012. Anyway, the minimum, standard deviation, and mean numbers do not meet the same movements and remain unrevised during six-year period.

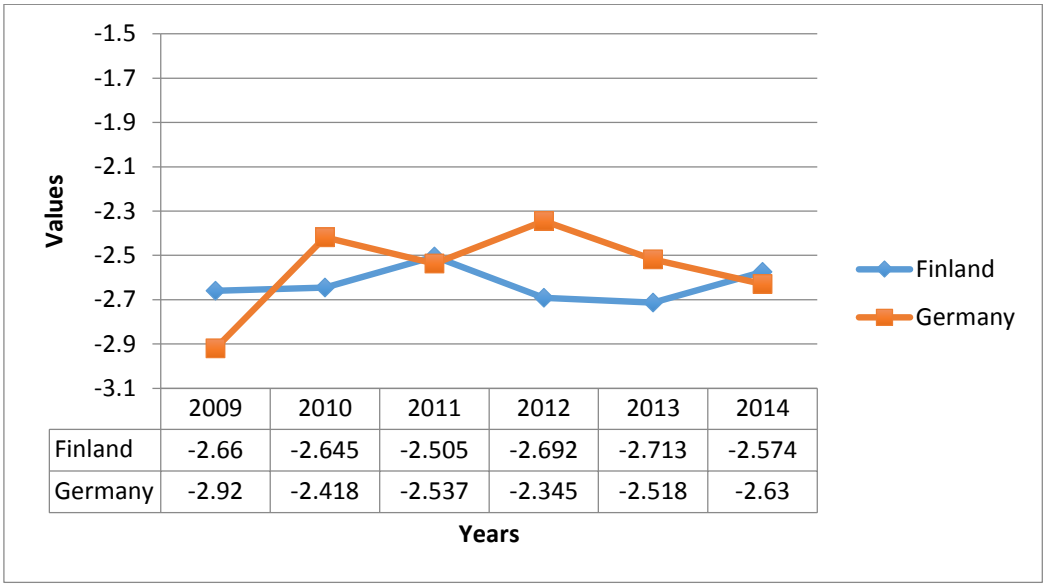
Concerning the AQI, the standard deviation correlates with mean numbers over six year period. The value of the minimum indicators does not disperse drastically, while the respective rise and consecutive fall in 2011 was implemented. The overall movement of the maximum values was rather stabilized, but the level of volatility and upward movements occurred in 2013 year.

With the respect to the SGI indicators of German market, the general tendency of the mean and standard deviation can be defined without radical fluctuations. In other words, both indicators tend to follow mutual shifts, and stay quite permanent over the years. The radical changes might be observed about the maximum values with the high level of disperse from 2010 till 2013 years. The curve of standard deviation illustrates marginal upward shift in 2012.

Considering the DEPI and SGAI indexes, the standard deviation and mean values do not scatter over the years, the curves indicate the absence of the significant fluctuations and movements over the period. The main similarity between the both indexes covers the shifts of the maximum value starting from 2010 year till 2013. On the other hand, the minimum value remains stable without substantial alterations. All in all, the both graphics represent the overall static situation.

It is possible to notice the same tendency about the indexes of TATA and LEVI. The curves of standard deviation and mean values stay on without alterations. The maximum values visualize the movements; the periods of rises are substituted by the decline changes. The main difference between two indicators over the years is the minimum values dispersion. TATA has more fluctuations during six-years comparing with the LEVI indicator.

After the analysis of each variable of the formula, it is possible to conduct, which market is more fruitful for the potential investments. According to the Figure 2, the level of earnings manipulations is lower on the Finnish market because all the figures tend to be allocated on the point less than -2,5.




| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|---|
| Finland | -2.66 | -2.645 | -2.505 | -2.692 | -2.713 | -2.574 |
| Germany | -2.92 | -2.418 | -2.537 | -2.345 | -2.518 | -2.63 |

Figure 2. Comparison of M-score indexes on the base of Finnish and German companies over six- year period.

## 5.2 Inferential statistics: correlations

Via the correlational analysis, some form of the correspondence was identified in the pairs of variables. In the correlational statistic tables, the relationships between the independent and dependent variables of Beneish M-score formula are presented. Independent variables comprise components of Beneish M-score formula: Days' Sales in Receivable Index (DSRI); Gross Margin Index (GMI); Asset Quality Index (AQI); Sales Growth Index (SGI); Depreciation Index (DEPI); Sales, General and Administrative Expenses Index (SGAI); Total Accrual to Total Assets (TATA); Leverage Index (LVGI); and dependent variable represents M-score index. The analysis of the both Finnish and German markets during six-year period is presented below, and the pairs of the highest level of association are presented respectively.

In the current studies, the researcher intends to test the proposed hypothesis with the help of the correlational statistics and analysis. In

addition, inferential statistics assists to respond on the main research questions.

With respect to the Finnish market, relying on the correlation analysis during the six year period, the researcher detected the significant positive degree of association between the following independent variables and M-score: Days' Sales in Receivable Index (DSRI), Gross Margin Index (GMI) and Total accrual to total assets (TATA) (see Appendices 33,34,36,37,38). In other words, as the relationship is positive, it means when these variables increase, the likelihood is higher that revenues and earnings are overstated. That is to say, that after the literature review, it was stated that Days' Sales in Receivable Index (DSRI) and Total accrual to total assets (TATA) perform as the manipulation factors, and Gross Margin Index (GMI) as the motivational factor for the earnings overstatement.

Regarding the positive relation of the Days' Sales in Receivable Index (DSRI), it is possible to conclude that when the quantity of the outstanding invoices or money debts from the clients increases intensively and exceeds the number of the revenues, it might be a signal for the probability of earnings manipulations. As far as the disproportionate changes happen with the receivables, mostly it signals that the company has troubles with the money collections from the clients, and it is a direct way to influence the cash flow of the company. The main intentions to anticipate this policy are to goat the sales in the face of higher competition or to extra-valuate the financial situation in front of the investors.

The correlational matrix states that Gross Margin Index (GMI) has a strong impact on the M-score figure. In other words, when the Gross Margin Index (GMI) undergoes the alterations, it might be a negative cue about the company's prospects and intentions. As a fact, Gross Margin Index (GMI) performs the position of the total revenues, which the company receives after the deduction of the cost of goods. Gross Margin Index (GMI) figure is a very efficient tool for the potential investors as it helps to evaluate the total

performance of the company. In more details, it is easy to assess the future possible returns and to compare the companies on the market. Relying on the Gross Margin Index (GMI) it is a simple way to interact and influence the investors' decisions. Therefore, Gross Margin Index (GMI) might be a pioneering signal of the feasible earnings overstatements and misrepresentation of the reporting standards.

The correlation statistics encourages concluding that Total Accruals to Total Assets (TATA) has a strong relation with M-score index on the Finnish market. By the way of explanation, one of the most influencing components of the earnings management is the tendency to manipulate the accruals. Consequently, the estate of the corporate accrual might be a proxy to evaluate the general condition of the earnings quality within the company. Additionally, as higher the percentage of the accruals to the total assets, there is a higher probability that the earnings quality was lowered.

The next ratio described in the correlation table, which has a strong but negative correlation is Sales, General and Administrative Expenses Index (SGAI). In the other words, surprisingly but when the index has a disproportionate decrease that means then the M-score number will increase respectively. But the tendency does not appear during the whole six-year period, the researcher just determined the strong relation with M-score figure in 2011 year (see Appendix 35).

With regards to the German market, the same correlational statistics was implemented with the identically- prescribed independent and dependent variables. But the researcher derived slightly different results comparing with the Finnish market. It was mentioned above that the variables might be considered as two subgroups- motivational and manipulation factors. In the wake of that, concerning the German companies the manipulation signals are Days Sales in Receivables Index (DSRI), Asset Quality Index (AQI), Total Accruals to Total Assets (TATA), and motivational signals are Sales

Growth Index (SGI) and Sales, General and Administrative Expenses Index (SGAI) (see Appendices 40,41,42,43,44,45).

Due to the fact that the Finnish and German markets have similarities concerning the variables that influence the M-score and have strong relationship, the researcher will rely on the explanation of the ratios in case of Finnish companies in combination with the description of the new-appeared ratios with strong relation. As it was stated above, the variables DSRI (Days Sales in Receivables Index), Total Accruals to Total Assets (TATA) have been already explained. What is new appears on the German market- Asset Quality Index (AQI) and Sales Growth Index (SGI).

The variable Asset Quality Index (AQI) has a positive sign with the M-score index. According to Wahlen, Baginski and others, (2015, 465), AQI (Asset Quality Index) is an aggregate measure of the asset realization change, and if the indicator increases intensively year by year, it is a signal about the earnings manipulations. The main intentions to raise the asset realization conclude the tendency to capitalize and to bow the expenses.

The next variable with a strong positive association on the German market is the Sales Growth Index (SGI) (see Appendix 40,41,42). Generally speaking, this ratio does not imply the overstatement activities of the earnings or does not perform as a signal for the manipulation. Therefore, the ratio Sales Growth Index (SGI) intends to estimate the companies and its performance. According to this fact, it is possible to conclude that when the firms have higher Sales Growth indexes, there is a higher probability that the company might be involved in the earnings manipulations. It is a fact that intensively growing firms tend to achieve higher profits and to expand their financial prevalence. Consequently, the board of managers feels more pressure to gain the aimed profits and to achieve new corporate horizons. Therefore, it is necessary to pay more attention to the companies with the high Sales Growth Indexes in order to investigate its financial practices and future earning targets.

Taking into the consideration the next variable, the researcher has found out some similarities concerning the Sales, General and Administrative Expenses Index (SGAI) with the Finnish companies. The tendency about the negative strong correlation in 2011 year was identified. Obviously, the variable was under the impact in 2011 on the both markets.

In conclusion, it is possible to state that the correlational analysis assisted to draw the answers for the research questions and problems. With the help of the inferential statistics, the association of the following variables with the M-score figure was detected: the Days' Sales in Receivable Index (DSRI), Gross Margin Index (GMI), the Total accrual to total assets (TATA), the Sales Growth Index (SGI), the Asset Quality Index (AQI), the Sales, General and Administrative Expenses Index (SGAI). In other words, it is worth to conclude that the independent variables of the Beneish M-score model are capable to reflect the precise tendency concerning the earnings manipulations on the basis of Finnish and German companies.

Relying on the results of the inferential statistics, correlational analysis, it is worth to prove that the stated hypotheses in the studies should be accepted. The independent variables show the positive correlation with the likelihood of the earnings manipulations both on the Finnish and German markets respectively.

# 6. Discussion

The main goal of this subchapter of the thesis is to increase awareness and to provide deeper understanding about the research results. Moreover, it is worth to compare the key findings with the research questions and composed hypotheses in the beginning of the studies; to state the suitable solutions and suggestions. Additionally, in this subchapter the researcher discusses the connate limitations and restrictions during the research process. The practical implications and potential future avenues of the research outcomes are also conducted.

## 6.1 Summary of key findings

Generally speaking, the main targets of the current research were to detect the characteristics of the sound policy concerning the earnings quality and reporting, to fix on which market, either Finnish or German, is more favorable for the future investments due to the low tendency of the earnings manipulations, to point out which variables influence more on the M-score predictions.

The theoretical and empirical analyses assisted the researcher to find out the solution to the first research questions. High quality of earnings and reporting within the company is an absolutely opposite edge to the earnings overstatements and manipulations. Through the comparison with the non-manipulators, it is of an easy way to set up the characteristics, which are prescribed to the manipulators, and might perform as the signals of the earnings and reporting overstatements. The high earnings quality might be described relying on the following definitions : the quality of conservatively determined earnings is high because there is a small chance of overestimation in the scope of future developments and alterations; earnings reflect the high quality characteristics in case of the accurate reflection of the change in the net asset because of earning activities; high-quality earnings exhibit low volatility over-time; it is uncomplicated to make a forecast about the earnings; there is a relatively small percentage of accruals in high-quality earnings (Sloan 1996, 289-315); the current level of earnings is a good proxy for the expected level of earnings in the near future, and it implies a relatively predictable level of volatility relying on the near forecast. Relying on the theoretical analysis, it was pointed out that the quality of the financial reporting is at high level of significance because it has the direct relation to the potential financial decisions. Financial reporting quality requires companies to expand the scope and quality of the reported information in order to facilitate greater transparency and lowering the asymmetry of the information. Consequently, the main purpose of the financial reporting information epitomizes a basis and supports for the

judgments and decisions on the capital market. Financial reporting quality is of high interest because it leads to the high quality decisions and judgments to satisfy the needs of investors' and stakeholders. Moreover, the next mission of the financial reporting quality is to evaluate the assigned tasks of the participants in information creation or dissemination, for instance, relying on the GAAP principles (Francis, Olsson, & Schipper 2006, 10). Therefore, it is possible to sum up that high earnings and reporting quality plays a significant role in the whole incorporate strategy and financial flows. The above-stated characteristics are in the lack among the market manipulators.

What is about the second research question, the outcomes of the thesis provide the following logical answers. With the help of the SPSS statistical software and the function of the descriptive analysis related to the Beneish M-score variables, the researcher was able to state which market is threatened less by the manipulators and is more suitable for the solemn investments. Descriptive statistics provides with an opportunity to summarize the descriptive coefficients of a database that might be helpful in the analysis of the entire market. Furthermore, descriptive statistics allows observing data from a more meaningful point of view, using a combination of tabulated descriptions, graphical description and statistical commentary. The analysis of each comprising value of the formula over the years assisted to state that the level of earnings manipulations is lower on the Finnish market because all the figures tend to be allocated on the point less than -2,5.

Regarding the last research question, which was aimed to detect which variables of Beneish M-score formula have more impact on the M-score. The researcher supports that the correlational analysis assisted to draw the association of the following variables with the M-score figure: the Days' Sales in Receivable Index (DSRI), Gross Margin Index (GMI), the Total accrual to total assets (TATA), the Sales Growth Index (SGI), the Asset Quality Index (AQI), the Sales, General and Administrative Expenses Index

(SGAI). In other words, it is possible to conduct that the independent variables of the Beneish M-score model are capable to reflect the precise tendency concerning the earnings manipulations on the basis of Finnish and German companies.

With the respect to the stated hypothesis, relying on the results of the inferential statistics, correlational analysis, it is worth to prove that the proposed hypothesis in the studies should be accepted. The independent variables show the positive significant correlation with the likelihoodood of the earnings manipulations both on the Finnish and German markets respectively.

## 6.2 Limitations and recommendations

Concerning the limitations of the current research outcomes, a set of the potential issues might be conducted in order to bring even more clarity to the current studies. The list of the associative limitations is described below.

Firstly, the sample of the companies, which financial information was accordingly applied to the formula calculations, was chosen from the panel of public listed enterprises on the stock exchanges of the both Finnish and German markets. Thus, not all the existing companies are involved, and the studying sample is not full to provide the real accurate market situation concerning the earnings manipulations. Secondly, that the Beneish M-score formula requires an applicable set of financial data derived from the companies' financial reports. Hence, that each company has its own frame to conduct the report; it is sophisticated to acquire the accurate information due to the time-consuming process. Furthermore, some financial information required for the calculation was not presented in the financial report, thus, the researcher needed to surf the other websites in the Internet that offer to find out financial information such as Yahoo Finance. The next limitation arose during the research process that the topic of the thesis is quite modern due to the fact that the mathematical model appeared only several years ago. As a consequence, the researcher had a lack of

information to derive from the secondary sources of information as books because it is not still accurately examined and explained among financial scientific rounds. That is why, the study is preliminary based on the scholars research papers and articles. Finally, due to the fact that the researcher is still a bachelor student, the absence of some profound theoretical and analytical skills might be a limitation concerning the outcomes of the study.

Taking into the consideration the fact that the limitations of the research might be sufficient recommendations for the future studies, the following proposals might be used once as a research topic. First of all, if to include the whole market companies into the analysis and calculations and to create a fully detailed sample of companies about each market, the outcomes concerning the market earnings manipulations might be more accurate and precise. Furthermore, due to the fact that the main analysis technique applied in the thesis is the inferential statistics in form of the correlations; to add several more analysis techniques would enhance the profound set of data and rigorous research results. Finally, after conducting the current situation of the earnings manipulation on the Finnish and German markets, the potential research avenues might include the researches concerning the possible solutions and suggestions how to deal with the manipulators on the market; to draw the more detailed reasons and consequences concerning such practices. The next researchers can add more proxy concerning the data variables to make more precise predictions concerning the financial manipulations.

## 6.3 Practical implications

It is a fact that a financial statement manipulation is an ongoing issue in various corporate departments all over the world. Consequently, the analysis of the earnings manipulations on the market level might be efficient for a wide group of participants in the financial market operations to prevent the potential deprival of the malfeasances, and to help to forward a reduction of fruitful environment for manipulation activities.

First and foremost, the conducted research results might be useful for the

potential investors on the Finnish and German markets in order to evaluate the whole financial situation and the level of riskiness for the investments. Preliminary those investors, who obtain the individual stocks and bonds, must have a high awareness about the probable issues, warnings signs and figures. Relying on such an opportunity, the investors might set up the tools at their power of disposal to bowl down the adverse implications of earning manipulations.

Furthermore, the employees of the companies might use the derived research information in order to detect the financial strategy of the upper management and get off the situation to be involved in such activities. Due to the fact that earnings manipulations are usually perpetrated by the upper board of managers due to the wide range of bonuses and accelerate access to the information, the lower- hierarchy placed employees tend to operate in smoke screening condition.

The consciousness of the fact that Beneish M-score model contributes to detect the level of earnings manipulations within the company assists to draw the whole financial picture on the market level. Therefore, before its application and relying in order to make the investment, the investors should take into consideration all the possible drawbacks and inaccuracies of the proposed technique.

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# Appendices

## Appendix 1. Descriptive Statistics Finland 2009

| Year | 2009 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,7480 | 2,2469 | 1,1227 | 0,2839 |
| **GMI** | 60 | -6,1677 | 19,9727 | 1,2367 | 3,1735 |
| **AQI** | 60 | -0,2746 | 8,1599 | 1,2817 | 1,2249 |
| **SGI** | 60 | 0,4397 | 1,2426 | 0,8396 | 0,1603 |
| **DEPI** | 60 | 0,1421 | 2,4795 | 0,9779 | 0,3880 |
| **SGAI** | 60 | 0,4076 | 2,4949 | 1,0870 | 0,2956 |
| **TATA** | 60 | -0,3006 | 0,0782 | -0,0820 | 0,0751 |
| **LEVI** | 60 | 0,5190 | 2,2670 | 0,9676 | 0,2786 |
| **M-score** | 60 | -6,9066 | 1,2763 | -2,6600 | 1,6991 |

## Appendix 2. Descriptive Statistics Finland 2010

| Year | 2010 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,7400 | 3,8425 | 1,0560 | 0,3933 |
| **GMI** | 60 | -4,0309 | 9,5116 | 0,7982 | 1,6707 |
| **AQI** | 60 | -1,9173 | 4,2335 | 0,9589 | 0,6861 |
| **SGI** | 60 | 0,3277 | 1,7887 | 1,1179 | 0,1950 |
| **DEPI** | 60 | 0,6442 | 8,4335 | 1,2737 | 1,1463 |
| **SGAI** | 60 | 0,3885 | 13,2854 | 1,1918 | 1,6039 |
| **TATA** | 60 | -0,2412 | 0,0667 | -0,0412 | 0,0563 |
| **LEVI** | 60 | 0,5220 | 2,7370 | 1,0159 | 0,2585 |
| **M-score** | 60 | -5,5688 | 2,2184 | -2,6567 | 1,0813 |

# Appendix 3. Descriptive Statistics Finland 2011

| Year | 2011 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 06606 | 1,6986 | 0,9963 | 0,1702 |
| **GMI** | 60 | -6,441 | 3,9345 | 0,8653 | 1,1754 |
| **AQI** | 60 | -0,6544 | 17,5379 | 1,3030 | 2,1679 |
| **SGI** | 60 | 0,5415 | 1,7407 | 1,1115 | 0,1684 |
| **DEPI** | 60 | 0,1369 | 5,0341 | 1,1015 | 0,7055 |
| **SGAI** | 60 | 0,3176 | 1,6616 | 1,0009 | 0,1911 |
| **TATA** | 60 | -0,3564 | 0,1123 | -0,0381 | 0,0687 |
| **LEVI** | 60 | 0,6160 | 1,7510 | 1,0189 | 0,1552 |
| **M-score** | 60 | -6,6862 | -1,2574 | -2,6622 | 0,8847 |

# Appendix 4. Descriptive Statistics Finland 2012

| Year | 2012 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,2674 | 1,5795 | 0,9442 | 0,1813 |
| **GMI** | 60 | -6,2076 | 5,3166 | 0,8583 | 1,5337 |
| **AQI** | 60 | 0,8108 | 2,7980 | 1,0997 | 0,3369 |
| **SGI** | 60 | 0,7806 | 3,5686 | 1,0956 | 0,3522 |
| **DEPI** | 60 | 0,1534 | 6,0146 | 1,0085 | 0,7362 |
| **SGAI** | 60 | 0,0115 | 1,4309 | 0,8459 | 0,3411 |
| **TATA** | 60 | -0,2030 | 0,0897 | -0,0494 | 0,0600 |
| **LEVI** | 60 | 0,7700 | 1,6410 | 1,0264 | 0,1526 |
| **M-score** | 60 | -6,7555 | -0,3333 | -2,6929 | 0,9763 |

# Appendix 5. Descriptive Statistics Finland 2013

| Year | 2013 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,5023 | 1,4636 | 0,9892 | 0,1615 |
| **GMI** | 60 | -2,4231 | 20,4386 | 1,1033 | 2,7158 |
| **AQI** | 60 | 0,0220 | 3,6031 | 1,0224 | 0,4993 |
| **SGI** | 60 | 0,3704 | 1,4863 | 0,9416 | 0,1575 |
| **DEPI** | 60 | 0,1453 | 9,7984 | 1,2026 | 1,2796 |
| **SGAI** | 60 | 0,0855 | 7,5509 | 1,0222 | 0,9579 |
| **TATA** | 60 | -0,1832 | 0,1098 | -0,0523 | 0,0557 |
| **LEVI** | 60 | 0,4290 | 1,7490 | 1,0311 | 0,1988 |
| **M-score** | 60 | -4,8631 | -1,4990 | -2,8953 | 0,6087 |

# Appendix 6. Descriptive Statistics Finland 2014

| Year | 2014 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,2315 | 1,4032 | 0,9859 | 0,1637 |
| **GMI** | 60 | -1,3765 | 6,5830 | 1,0473 | 1,0124 |
| **AQI** | 60 | 0,3648 | 13,0738 | 1,2301 | 1,5949 |
| **SGI** | 60 | 0,7338 | 1,2494 | 0,9819 | 0,0757 |
| **DEPI** | 60 | 0,4485 | 3,4254 | 1,0737 | 0,4345 |
| **SGAI** | 60 | 0,8745 | 5,2241 | 1,1194 | 0,5539 |
| **TATA** | 60 | -0,2305 | 0,4318 | -0,0404 | 0,0842 |
| **LEVI** | 60 | 0,7020 | 1,2860 | 0,9798 | 0,1096 |
| **M-score** | 60 | -4,0234 | -0,5638 | -2,7091 | 0,5773 |

# Appendix 7. Descriptive Statistics Finland 2009-2014

| Years | 2009-2014 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 360 | 0,2315 | 3,8425 | 1,0157 | 0,2467 |
| **GMI** | 360 | -6,4419 | 20,4386 | 0,9848 | 2,0329 |
| **AQI** | 360 | -1,9173 | 17,5379 | 1,1493 | 1,2614 |
| **SGI** | 360 | 0,3277 | 3,5686 | 1,0147 | 0,2262 |
| **DEPI** | 360 | 0,1369 | 9,7984 | 1,1063 | 0,8500 |
| **SGAI** | 360 | 0,0115 | 13,2854 | 1,0445 | 0,8218 |
| **TATA** | 360 | -0,3564 | 0,4318 | -0,0505 | 0,0686 |
| **LEVI** | 360 | 0,4290 | 2,7370 | 1,0066 | 0,2014 |
| **M-score** | 360 | -6,9066 | 2,2184 | -2,7565 | 0,9134 |

# Appendix 8. Descriptive Statistics Germany 2009

| Year | 2009 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,2331 | 1,6574 | 1,0064 | 0,2388 |
| **GMI** | 60 | 0,6210 | 3,1611 | 1,1520 | 0,4464 |
| **AQI** | 60 | -3,4420 | 8,6424 | 1,1142 | 1,1620 |
| **SGI** | 60 | 0,4304 | 1,2036 | 0,8805 | 0,1581 |
| **DEPI** | 60 | 0,5299 | 3,7861 | 1,0953 | 0,5321 |
| **SGAI** | 60 | 0,6835 | 1,9209 | 1,1104 | 0,2592 |
| **TATA** | 60 | -0,4559 | 0,1613 | -0,0966 | 0,0983 |
| **LEVI** | 60 | 0,2710 | 1,9960 | 1,0193 | 0,2329 |
| **M-score** | 60 | -5,6233 | -0,8319 | -2,9483 | 0,7717 |

# Appendix 9. Descriptive Statistics Germany 2010

| Year | 2010 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,6934 | 2,0602 | 1,0489 | 0,2662 |
| **GMI** | 60 | 0,2683 | 1,7161 | 0,9643 | 0,2386 |
| **AQI** | 60 | -4,3940 | 2,0711 | 0,9264 | 0,7633 |
| **SGI** | 60 | 0,5314 | 2,5879 | 1,1731 | 0,2657 |
| **DEPI** | 60 | 0,4146 | 3,5661 | 1,1391 | 0,4445 |
| **SGAI** | 60 | 0,6069 | 2,2031 | 0,9737 | 0,2450 |
| **TATA** | 60 | -0,3903 | 0,7916 | -0,0199 | 0,1346 |
| **LEVI** | 60 | 0,4900 | 3,5020 | 1,0510 | 0,3826 |
| **M-score** | 60 | -5,2641 | -0,7479 | -2,4868 | 0,6785 |

# Appendix 10. Descriptive Statistics Germany 2011

| Year | 2011 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,6934 | 2,0602 | 1,0489 | 0,2662 |
| **GMI** | 60 | 0,2683 | 1,7161 | 0,9643 | 0,2386 |
| **AQI** | 60 | -4,3940 | 2,0711 | 0,9264 | 0,7633 |
| **SGI** | 60 | 0,5314 | 2,5879 | 1,1731 | 0,2657 |
| **DEPI** | 60 | 0,4146 | 3,5661 | 1,1391 | 0,4445 |
| **SGAI** | 60 | 0,6069 | 2,2031 | 0,9737 | 0,2450 |
| **TATA** | 60 | -0,3903 | 0,7916 | -0,0199 | 0,1346 |
| **LEVI** | 60 | 0,4900 | 3,5020 | 1,0510 | 0,3826 |
| **M-score** | 60 | -5,2641 | -0,7479 | -2,4868 | 0,6785 |

# Appendix 11. Descriptive Statistics Germany 2012

| Year | 2012 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,1900 | 8,4451 | 1,1741 | 1,0973 |
| **GMI** | 60 | 0,2347 | 27,2579 | 1,5577 | 3,4016 |
| **AQI** | 60 | -4,6810 | 1,3051 | 0,9149 | 0,7485 |
| **SGI** | 60 | 0,3729 | 6,6973 | 1,1984 | 0,9464 |
| **DEPI** | 60 | 0,2059 | 2,1705 | 0,9302 | 0,3175 |
| **SGAI** | 60 | 0,1604 | 3,0114 | 1,0610 | 0,3664 |
| **TATA** | 60 | -0,3060 | 0,1216 | -0,0520 | 0,0818 |
| **LEVI** | 60 | 0,4540 | 3,5420 | 1,0581 | 0,4009 |
| **M-score** | 60 | -6,7875 | -0,0993 | -2,7823 | 0,9361 |

# Appendix 12. Descriptive Statistics Germany 2013

| Year | 2013 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,1012 | 7,2034 | 1,0864 | 0,8540 |
| **GMI** | 60 | -1,0814 | 1,7511 | 0,9374 | 0,4201 |
| **AQI** | 60 | -1,7665 | 18,10 | 1,2286 | 2,2851 |
| **SGI** | 60 | 0,5023 | 1,5223 | 1,0118 | 0,1585 |
| **DEPI** | 60 | 0,4965 | 4,9935 | 1,2271 | 0,8331 |
| **SGAI** | 60 | 0,0021 | 1,6698 | 0,9726 | 0,219 |
| **TATA** | 60 | -0,2334 | 0,0978 | -0,0452 | 0,0610 |
| **LEVI** | 60 | 0,3043 | 1,5776 | 1,0202 | 0,1881 |
| **M-score** | 60 | -4,5787 | 1,5101 | -2,6696 | 0,8666 |

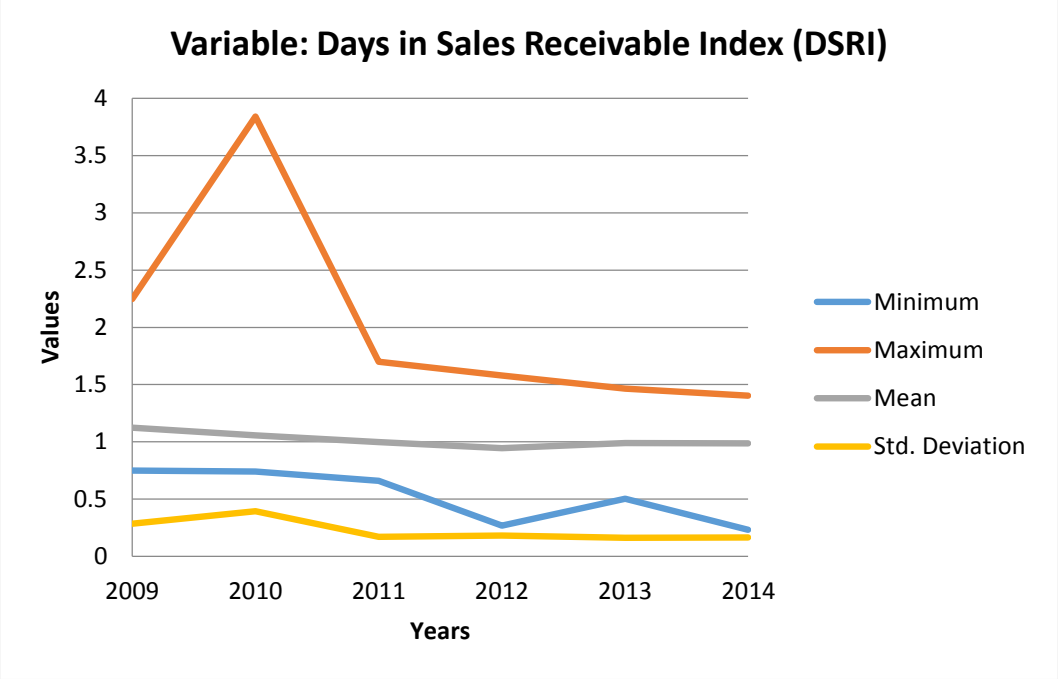
# Appendix 13. Descriptive Statistics Germany 2014

| Year | 2014 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 60 | 0,5476 | 3,2311 | 1,0830 | 0,3335 |
| **GMI** | 60 | -5,2598 | 2,2209 | 0,8982 | 0,8884 |
| **AQI** | 60 | 0,6043 | 2,6005 | 1,0510 | 0,2516 |
| **SGI** | 60 | 0,2477 | 2,8499 | 1,0421 | 0,2809 |
| **DEPI** | 60 | 0,2029 | 2,1221 | 1,0567 | 0,3716 |
| **SGAI** | 60 | 0,3618 | 3,7252 | 1,0719 | 0,4039 |
| **TATA** | 60 | -0,3262 | 0,2011 | -0,0424 | 0,0730 |
| **LEVI** | 60 | 0,5711 | 4,0867 | 1,0829 | 0,4105 |
| **M-score** | 60 | -4,3421 | -1,4290 | -2,6305 | 0,4832 |

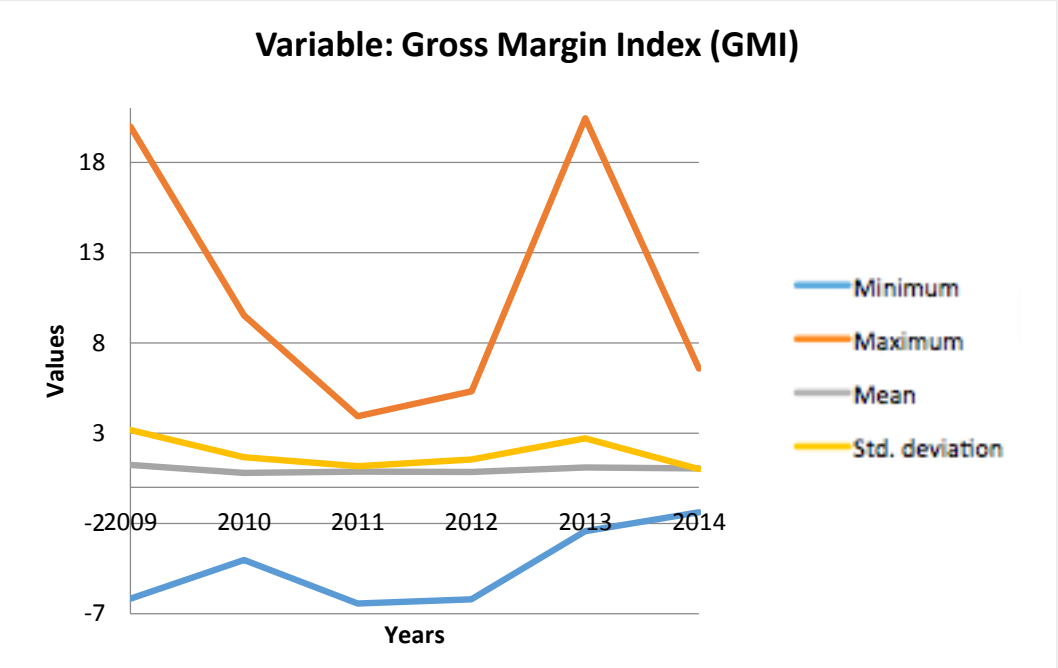
# Appendix 14. Descriptive Statistics Germany 2009-2014

| Years | 2009-2014 | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Standard Deviation |
| **Variables** | | | | | |
| **DSRI** | 360 | 0,1078 | 8,4589 | 1,0621 | 0,6062 |
| **GMI** | 360 | -5,2519 | 27,2604 | 1,1180 | 1,5583 |
| **AQI** | 360 | -4,6823 | 18,1003 | 1,0490 | 1,1426 |
| **SGI** | 360 | 0,2445 | 6,7099 | 1,0652 | 0,4409 |
| **DEPI** | 360 | 0,2009 | 5,0321 | 1,0842 | 0,5423 |
| **SGAI** | 360 | 0,0001 | 3,7237 | 1,0280 | 0,2966 |
| **TATA** | 360 | -0,8166 | 0,7995 | -0,0486 | 0,1012 |
| **LEVI** | 360 | 0,2792 | 4,0804 | 1,0403 | 0,3236 |
| **M-score** | 360 | -6,79 | -0,0322 | -2,6882 | 0,7465 |

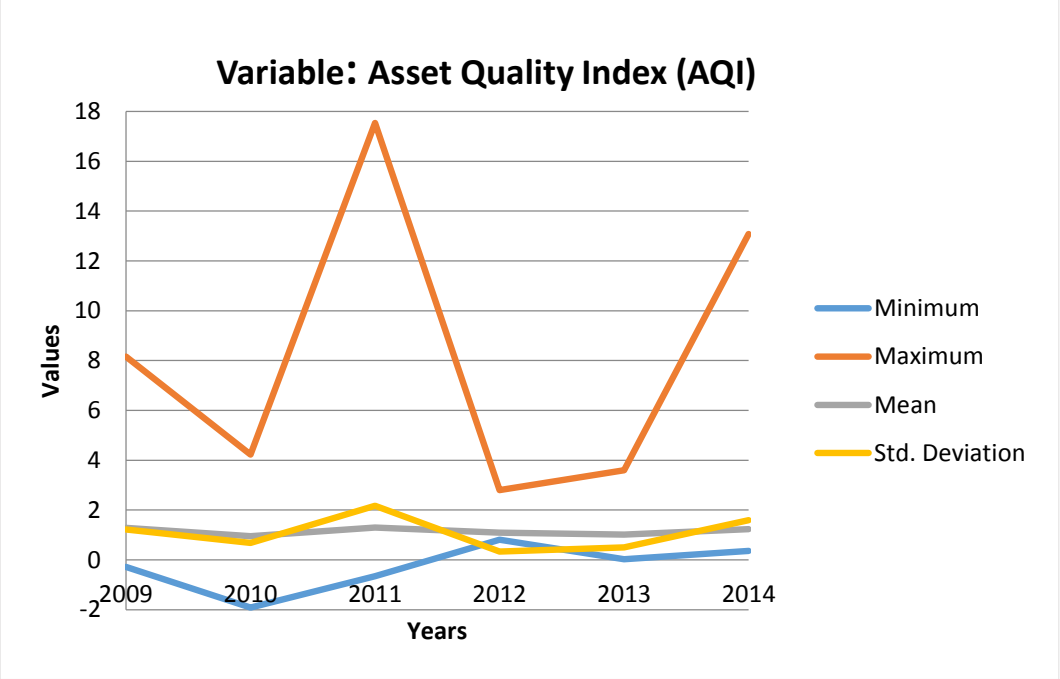
# Appendix 15. Descriptive Statistics Finland, DSRI



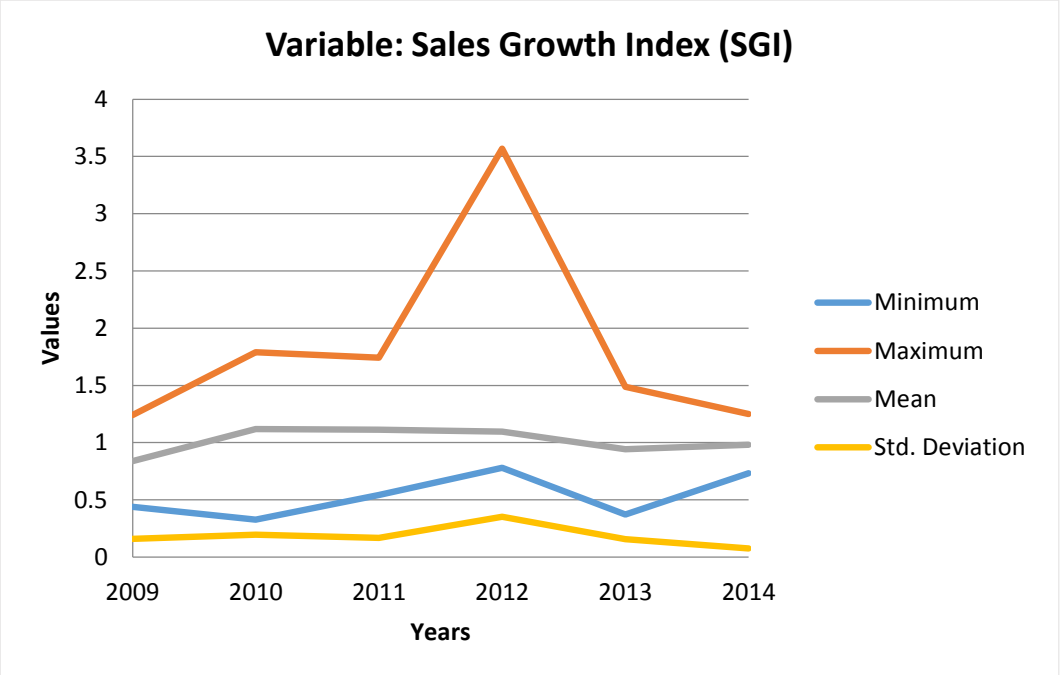

# Appendix 16. Descriptive Statistics Finland, GMI



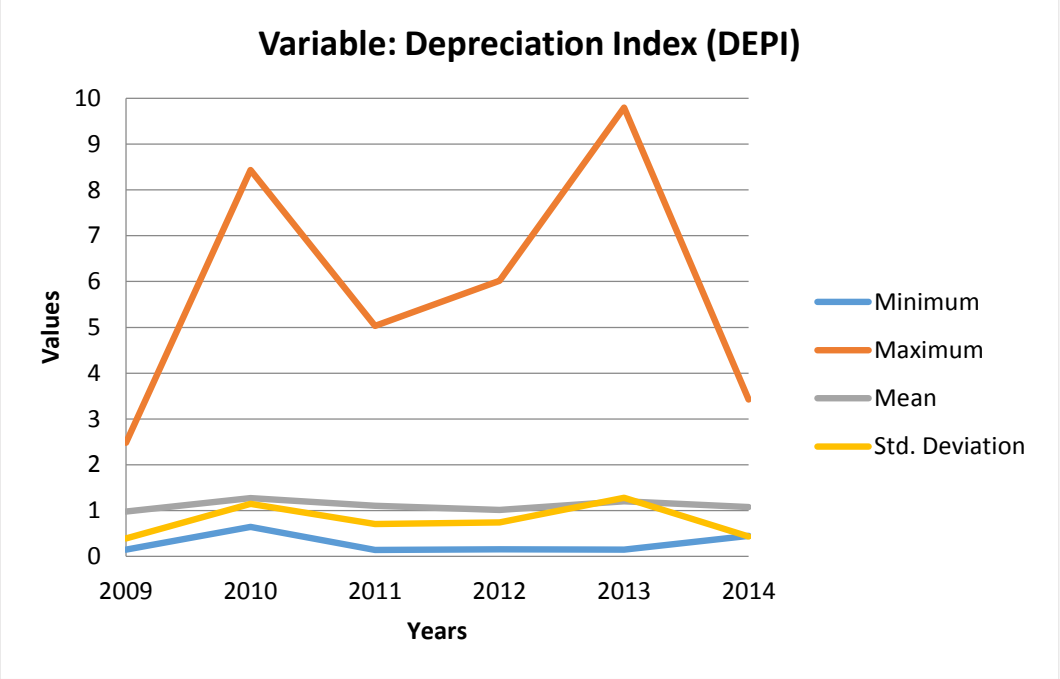
# Appendix 17. Descriptive Statistics Finland, AQI



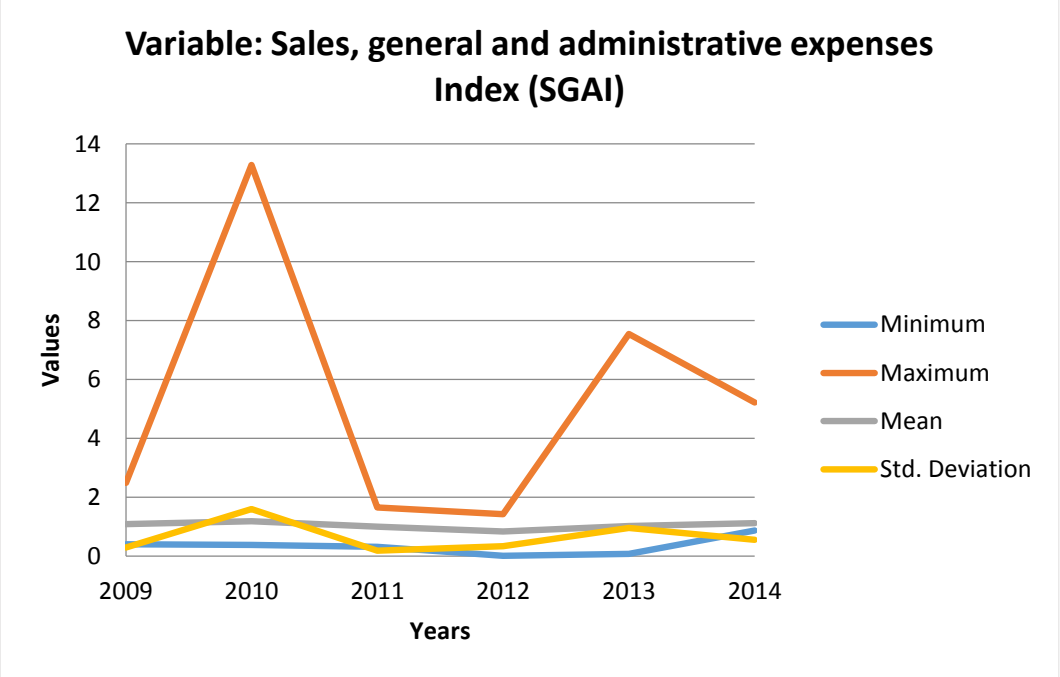

# Appendix 18. Descriptive Statistics Finland, SGI



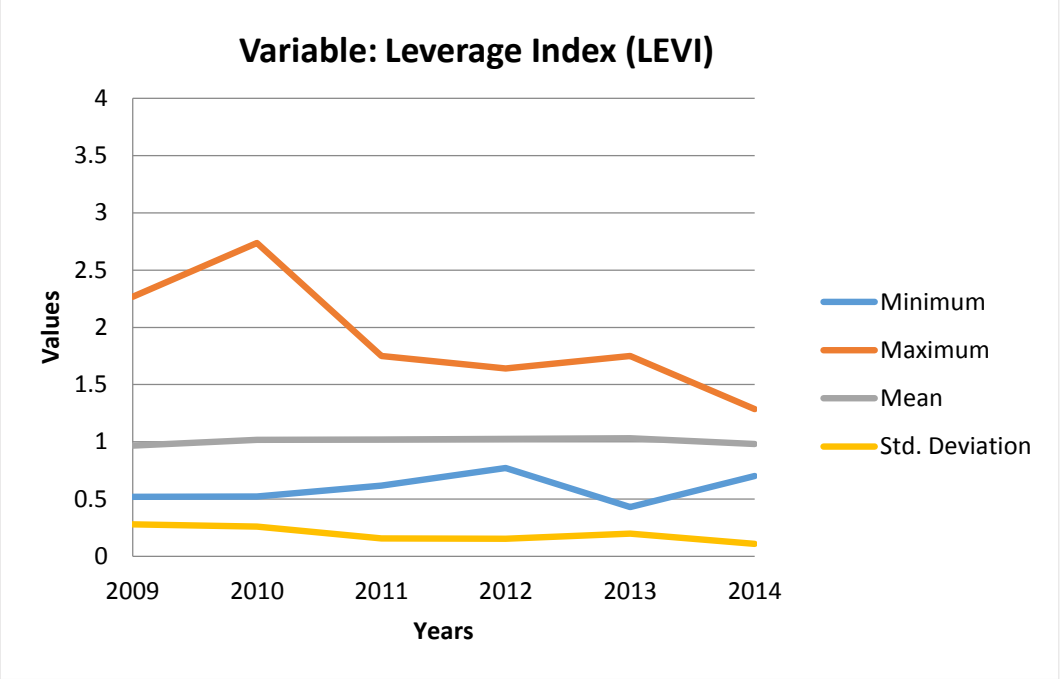
# Appendix 19. Descriptive Statistics Finland, DEPI



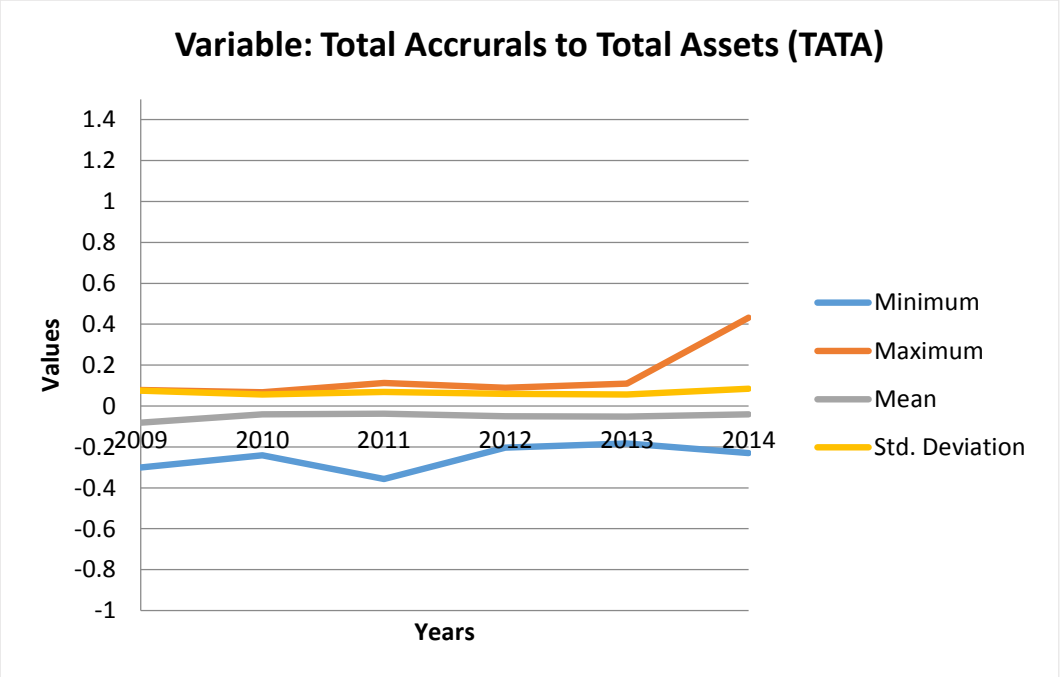

# Appendix 20. Descriptive Statistics Finland, SGAI



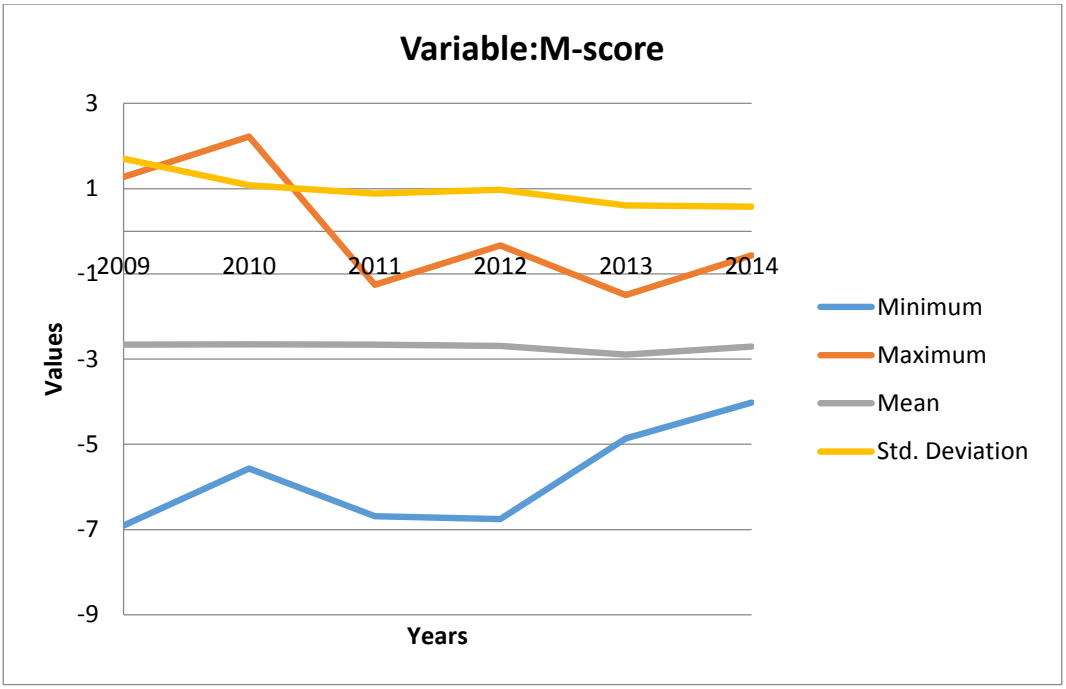
# Appendix 21. Descriptive Statistics Finland, LEVI



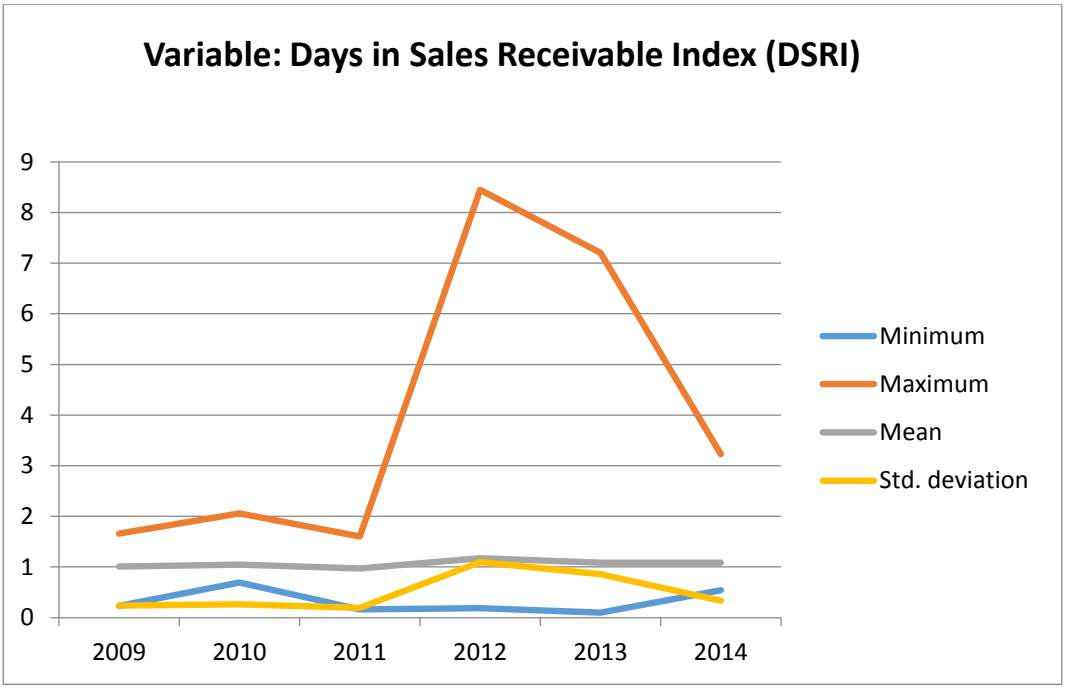

# Appendix 22. Descriptive Statistics Finland, TATA



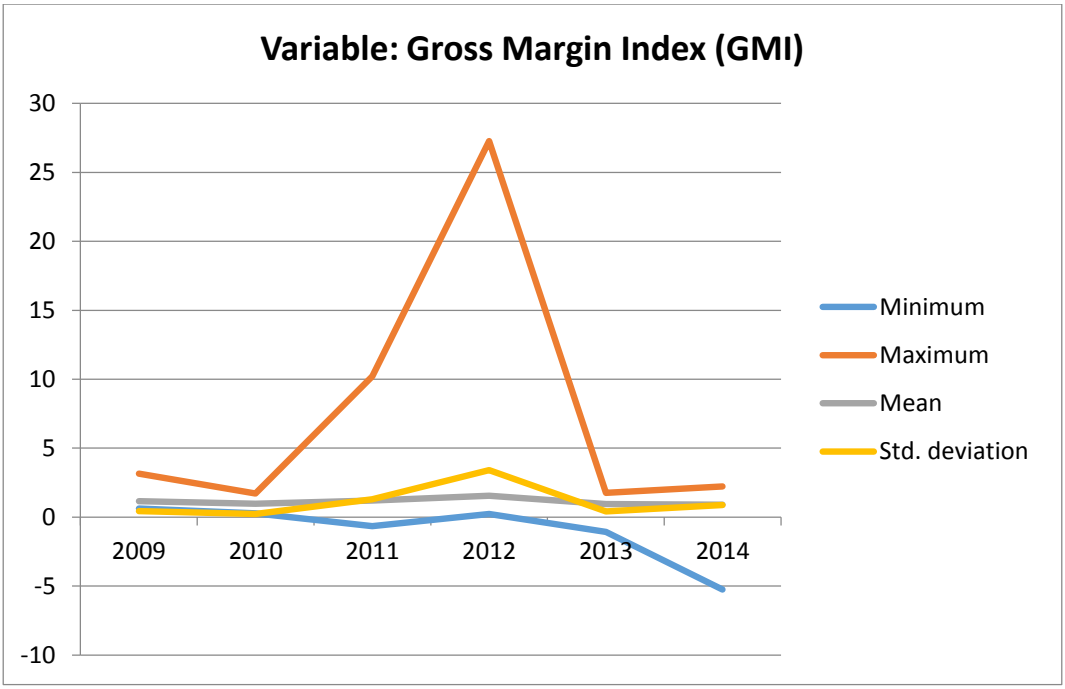
## Appendix 23. Descriptive Statistics Finland, M-score



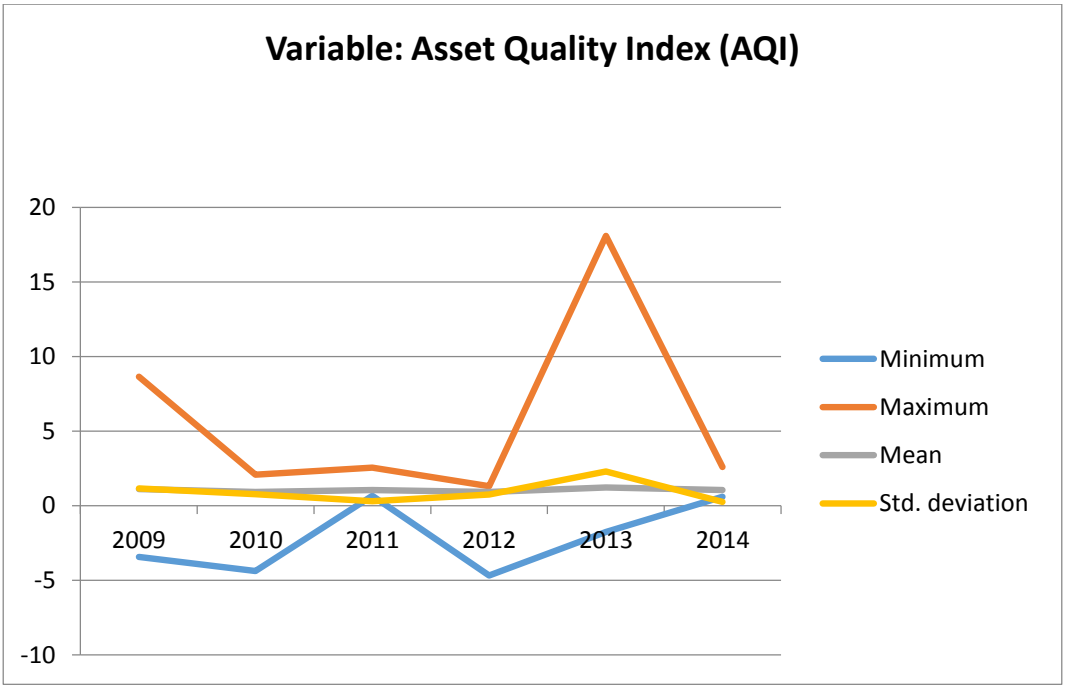

## Appendix 24. Descriptive Statistics Germany, DSRI



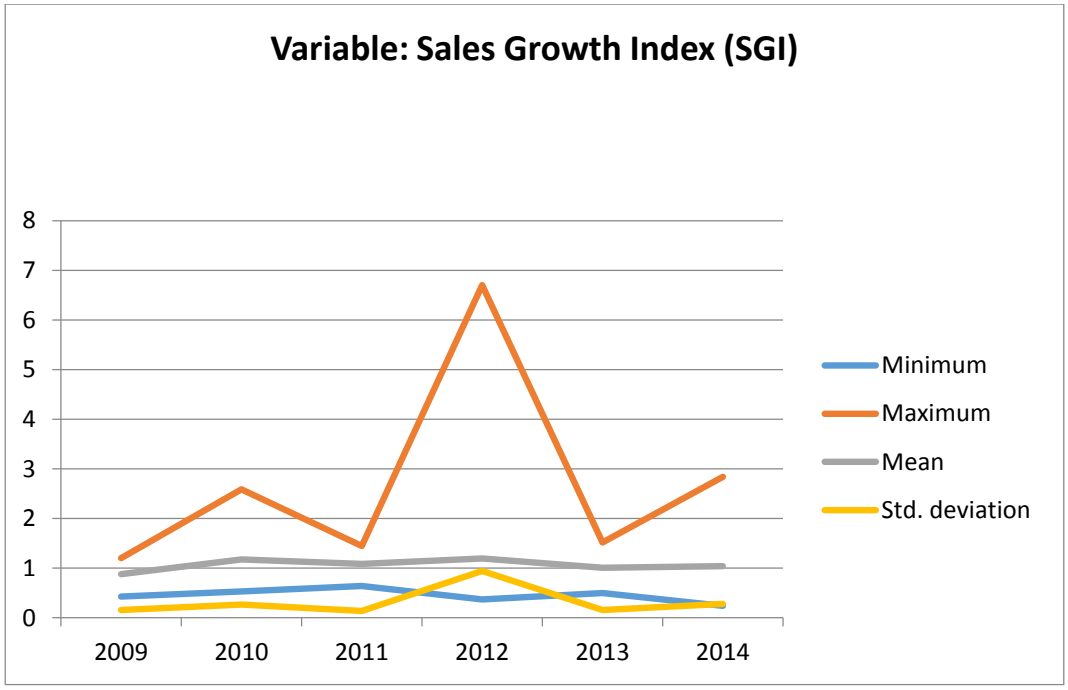
## Appendix 25. Descriptive Statistics Germany, GMI



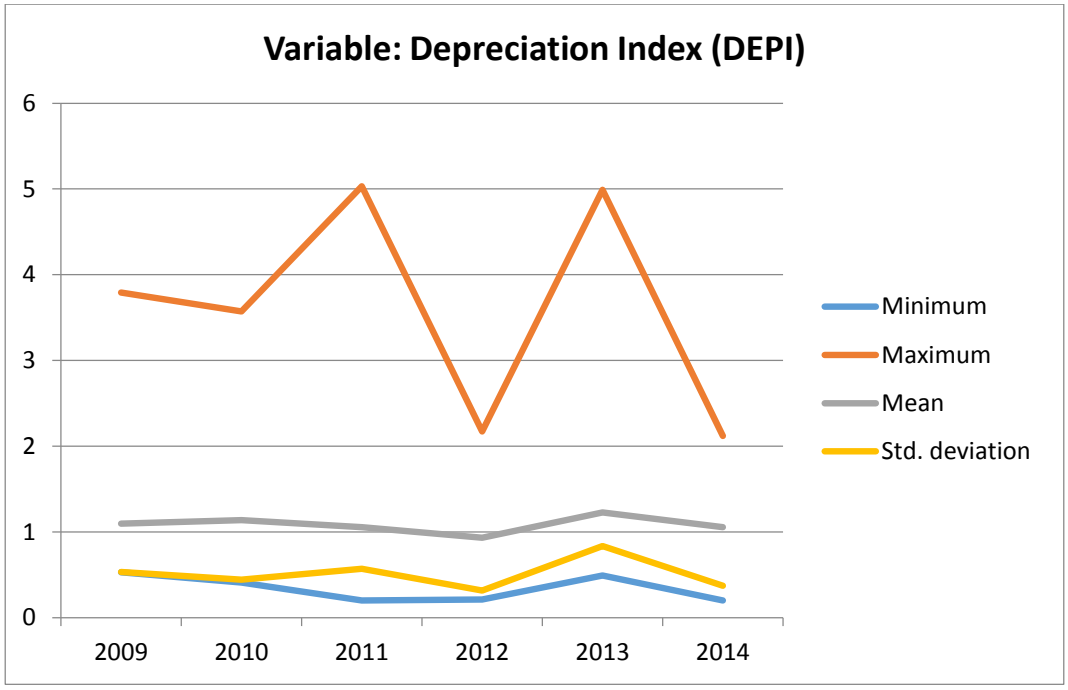

## Appendix 26. Descriptive Statistics Germany, AQI



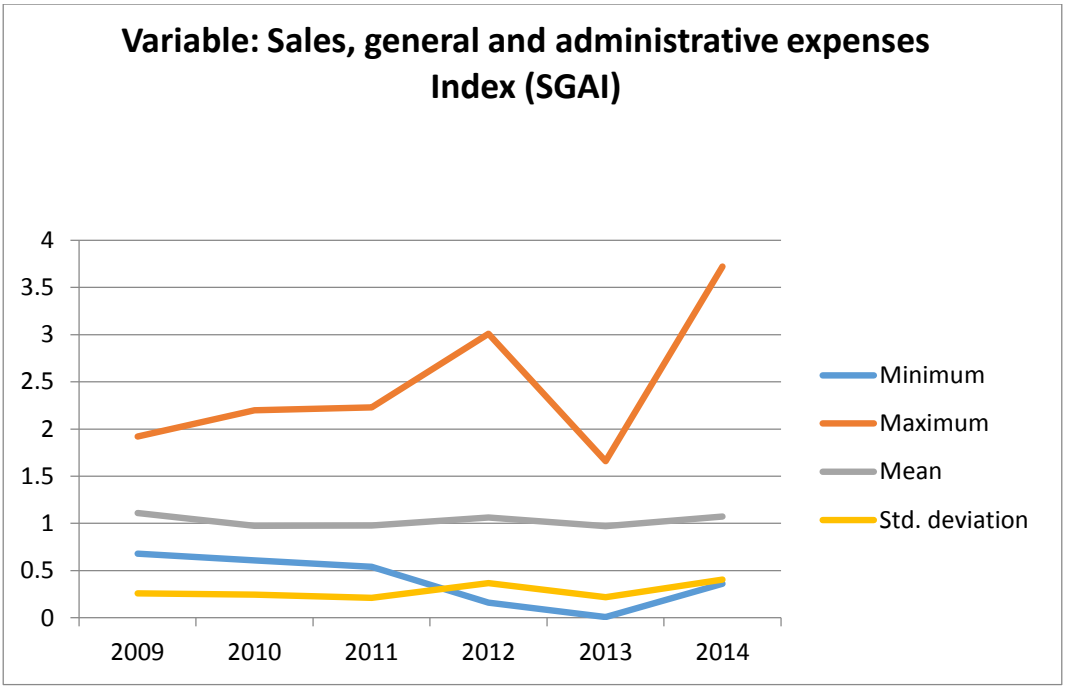
## Appendix 27. Descriptive Statistics Germany, SGI



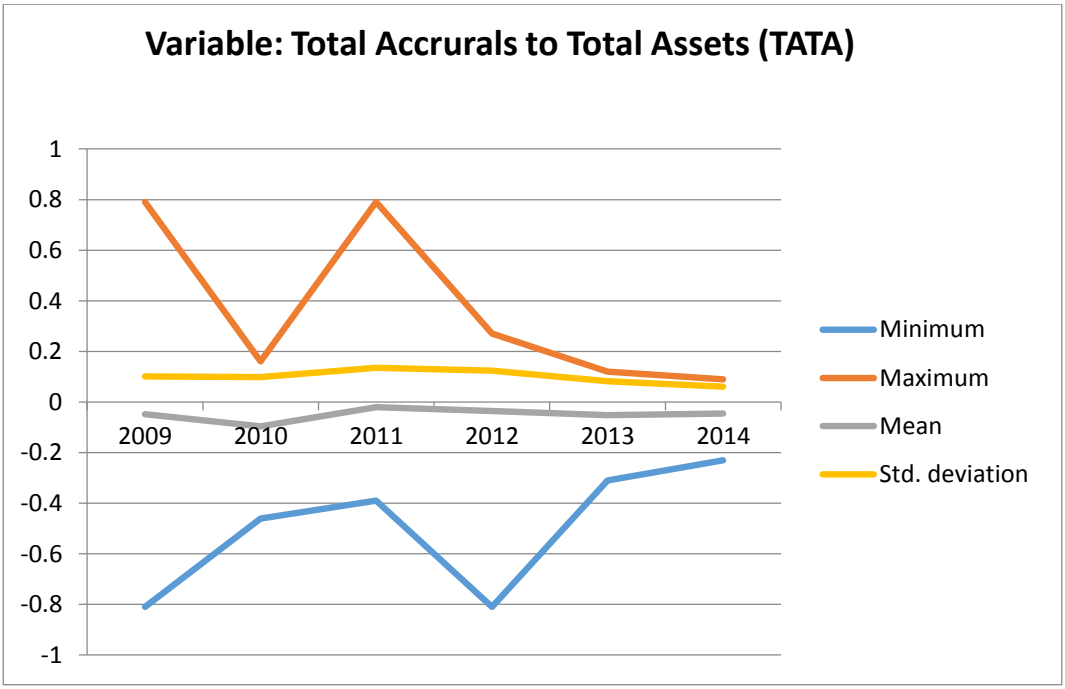

## Appendix 28. Descriptive Statistics Germany, DEPI



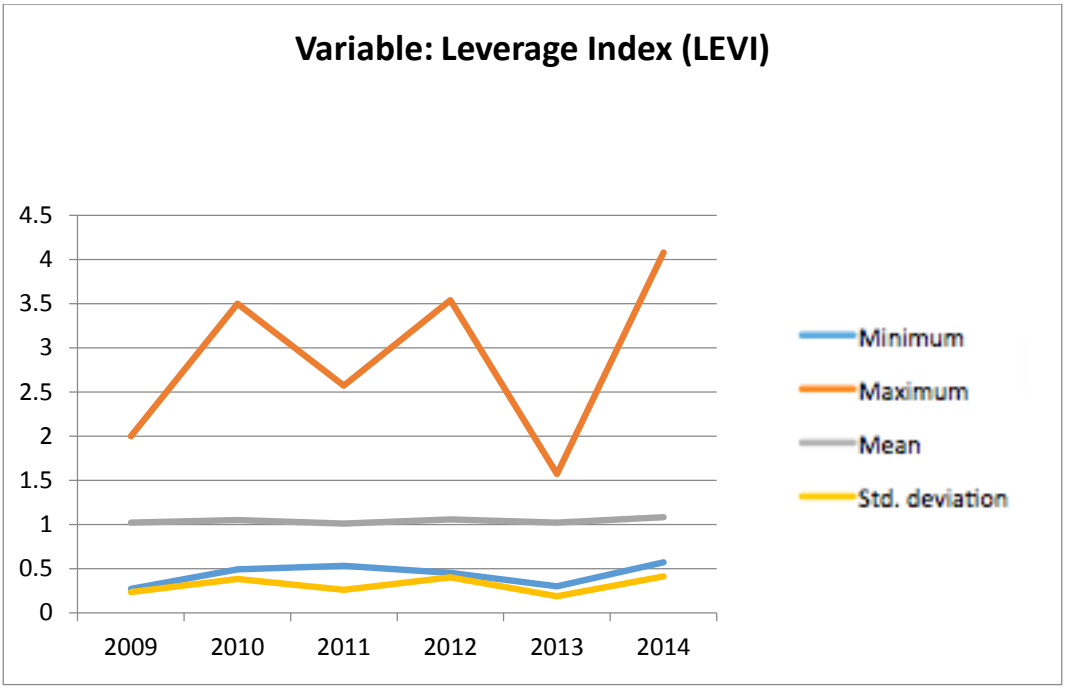
# Appendix 29. Descriptive Statistics Germany, SGAI



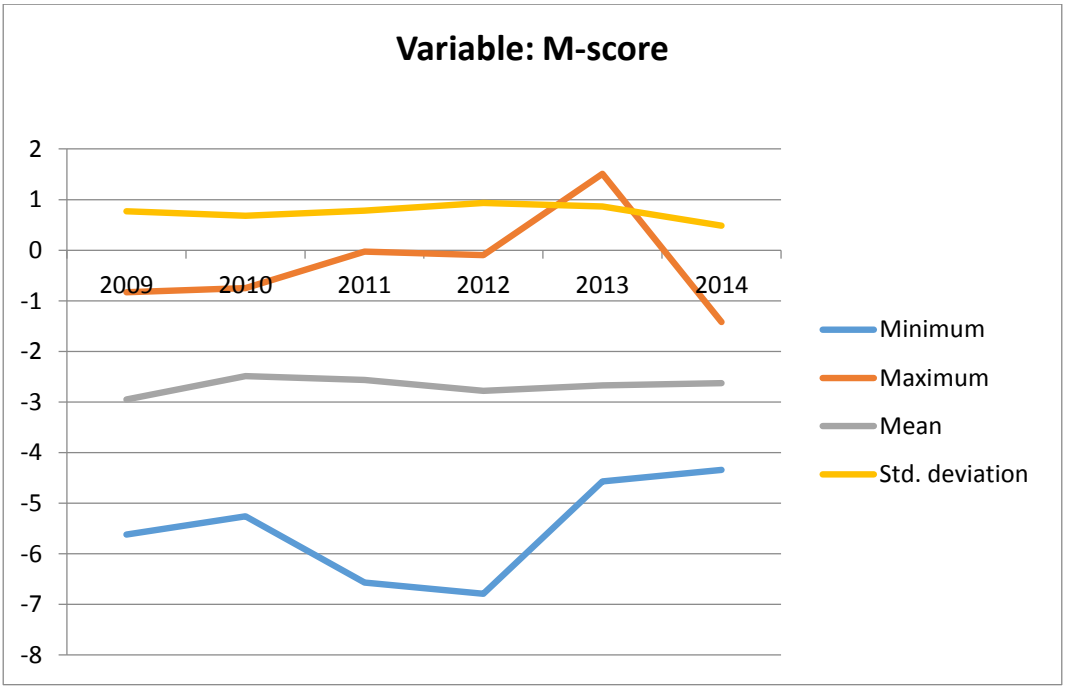

# Appendix 30. Descriptive Statistics Germany, TATA



## Appendix 31. Descriptive Statistics Germany, LEVI




## Appendix 32. Descriptive Statistics Germany, M-score



# Appendix 33. Inferential statistics: correlations, Finland 2009

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | -,065 | 1 | | | | | | | |
| **AQI** | -,002 | -,046 | 1 | | | | | | |
| **SGI** | -,420** | -,004 | -,070 | 1 | | | | | |
| **DEPI** | -,037 | -,113 | -,119 | -,273* | 1 | | | | |
| **SGAI** | ,274* | -,046 | ,000 | -,416** | -,050 | 1 | | | |
| **TATA** | ,353** | -,158 | -,058 | ,121 | ,188 | ,157 | 1 | | |
| **LEVI** | ,067 | ,203 | ,036 | -,061 | -,093 | ,091 | ,017 | 1 | |
| **M-score** | ,154 | ,791** | ,279* | ,112 | -,090 | -,050 | ,268* | ,227 | 1 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |

# Appendix 34. Inferential statistics: correlations, Finland 2010

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,087 | 1 | | | | | | | |
| **AQI** | ,057 | ,033 | 1 | | | | | | |
| **SGI** | -,607** | -,079 | -,002 | 1 | | | | | |
| **DEPI** | ,387** | -,126 | ,046 | -,243 | 1 | | | | |
| **SGAI** | ,012 | ,053 | ,032 | -,118 | -,007 | 1 | | | |
| **TATA** | ,073 | ,053 | ,309* | ,066 | ,111 | -,073 | 1 | | |
| **LEVI** | ,051 | ,025 | ,292* | ,150 | -,018 | -,046 | ,031 | 1 | |
| **M-score** | ,372** | ,803** | ,344** | -,100 | ,148 | -,228 | ,421** | ,074 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 35. Inferential statistics: correlations, Finland 2011

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | -,116 | 1 | | | | | | | |
| **AQI** | ,516** | ,075 | 1 | | | | | | |
| **SGI** | -,377** | ,353** | -,163 | 1 | | | | | |
| **DEPI** | ,109 | -,223 | -,037 | ,070 | 1 | | | | |
| **SGAI** | ,096 | -,332** | -,021 | -,316* | -,021 | 1 | | | |
| **TATA** | ,039 | ,167 | -,037 | ,182 | ,172 | -,267* | 1 | | |
| **LEVI** | ,059 | -,002 | -,068 | ,179 | -,055 | ,177 | -,241 | 1 | |
| **M-score** | -,184 | ,777** | -,254 | ,506** | -,006 | -,460** | ,590** | -,129 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 36. Inferential statistics: correlations, Finland 2012

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,093 | 1 | | | | | | | |
| **AQI** | ,142 | ,224 | 1 | | | | | | |
| **SGI** | -,599** | ,041 | -,063 | 1 | | | | | |
| **DEPI** | ,181 | -,193 | ,193 | -,258* | 1 | | | | |
| **SGAI** | ,055 | -,073 | ,244 | -,001 | ,148 | 1 | | | |
| **TATA** | ,193 | ,172 | -,151 | -,164 | -,116 | -,074 | 1 | | |
| **LEVI** | -,059 | -,038 | -,063 | ,264* | -,095 | ,014 | -,208 | 1 | |
| **M-score** | ,146 | ,929** | ,291* | ,162 | -,136 | -,087 | ,395** | -,086 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 37. Inferential statistics: correlations, Finland 2013

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,006 | 1 | | | | | | | |
| **AQI** | -,145 | -,024 | 1 | | | | | | |
| **SGI** | -,331** | -,141 | ,010 | 1 | | | | | |
| **DEPI** | -,032 | -,025 | -,117 | ,043 | 1 | | | | |
| **SGAI** | ,137 | ,021 | -,049 | ,037 | ,002 | 1 | | | |
| **TATA** | ,063 | -,169 | -,233 | -,106 | -,228 | ,084 | 1 | | |
| **LEVI** | ,089 | ,039 | -,077 | ,079 | -,166 | ,297* | -,006 | 1 | |
| **M-score** | ,165 | ,069 | ,051 | ,012 | ,132 | -,220 | ,317* | -,249 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 38. Inferential statistics: correlations, Finland 2014

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,310* | 1 | | | | | | | |
| **AQI** | ,017 | ,145 | 1 | | | | | | |
| **SGI** | -,145 | ,025 | -,091 | 1 | | | | | |
| **DEPI** | ,130 | -,343** | -,036 | -,018 | 1 | | | | |
| **SGAI** | ,039 | ,220 | -,036 | -,161 | -,109 | 1 | | | |
| **TATA** | -,011 | -,068 | ,005 | -,033 | ,187 | -,076 | 1 | | |
| **LEVI** | ,167 | ,069 | -,003 | -,245 | ,055 | ,042 | -,396** | 1 | |
| **M-score** | ,474** | ,621** | -,110 | ,075 | -,064 | -,027 | ,574** | -,187 | 1 |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |

# Appendix 39. Inferential statistics: correlations, Finland 2009-2014

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,027 | 1 | | | | | | | |
| **AQI** | ,113* | ,027 | 1 | | | | | | |
| **SGI** | -,426** | -,033 | -,067 | 1 | | | | | |
| **DEPI** | ,164** | -,101 | -,029 | -,082 | 1 | | | | |
| **SGAI** | ,070 | ,018 | -,002 | -,072 | ,006 | 1 | | | |
| **TATA** | ,083 | -,054 | -,021 | ,077 | ,032 | -,021 | 1 | | |
| **LEVI** | ,036 | ,078 | ,012 | ,123* | -,061 | ,046 | -,074 | 1 | |
| **M-score** | ,184** | ,705** | ,034 | ,097 | ,017 | -,127* | ,314** | ,015 | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

# Appendix 40. Inferential statistics: correlations, Germany 2009

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,188 | 1 | | | | | | | |
| **AQI** | -,055 | -,037 | 1 | | | | | | |
| **SGI** | -,179 | -,225 | ,012 | 1 | | | | | |
| **DEPI** | ,103 | -,171 | ,111 | -,068 | 1 | | | | |
| **SGAI** | ,018 | -,077 | -,086 | -,686** | -,027 | 1 | | | |
| **TATA** | ,127 | -,135 | ,220 | ,482** | ,091 | -,478** | 1 | | |
| **LEVI** | ,140 | ,303* | -,327* | -,065 | -,022 | ,047 | -,178 | 1 | |
| **M-score** | ,351** | ,178 | ,524** | ,406** | ,139 | -,509** | ,817** | -,253 | 1 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |

# Appendix 41. Inferential statistics: correlations, Germany 2010

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,457** | 1 | | | | | | | |
| **AQI** | ,249 | -,074 | 1 | | | | | | |
| **SGI** | -,236 | -,264* | -,002 | 1 | | | | | |
| **DEPI** | -,078 | -,157 | ,065 | ,187 | 1 | | | | |
| **SGAI** | ,276* | ,228 | ,280* | -,537** | -,065 | 1 | | | |
| **TATA** | ,505** | ,284* | ,149 | ,126 | ,077 | ,097 | 1 | | |
| **LEVI** | ,562** | ,514** | ,012 | -,051 | -,043 | ,222 | ,687** | 1 | |
| **M-score** | ,431** | ,054 | ,622** | ,375** | ,155 | ,090 | ,531** | ,067 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 42. Inferential statistics: correlations, Germany 2011

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | -,005 | 1 | | | | | | | |
| **AQI** | ,223 | ,061 | 1 | | | | | | |
| **SGI** | -,288* | -,150 | -,317* | 1 | | | | | |
| **DEPI** | -,275* | ,035 | -,100 | ,235 | 1 | | | | |
| **SGAI** | ,280* | -,138 | ,409** | -,693** | -,212 | 1 | | | |
| **TATA** | -,284* | ,296* | -,530** | ,490** | ,115 | -,655** | 1 | | |
| **LEVI** | -,414** | -,211 | ,005 | -,336** | -,251 | ,342** | -,207 | 1 | |
| **M-score** | -,098 | ,194 | -,260* | ,651** | ,135 | -,752** | ,836** | -,477** | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

# Appendix 43. Inferential statistics: correlations, Germany 2012

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,050 | 1 | | | | | | | |
| **AQI** | ,021 | ,027 | 1 | | | | | | |
| **SGI** | ,255* | -,095 | ,012 | 1 | | | | | |
| **DEPI** | -,121 | -,090 | ,096 | -,124 | 1 | | | | |
| **SGAI** | -,092 | ,688** | ,078 | -,549** | ,060 | 1 | | | |
| **TATA** | ,187 | -,215 | ,149 | ,147 | ,098 | -,352** | 1 | | |
| **LEVI** | -,045 | -,051 | -,830** | -,206 | -,169 | ,065 | -,293* | 1 | |
| **M-score** | -,505** | ,321* | ,479** | -,250 | ,239 | ,340** | ,152 | -,507** | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

# Appendix 44. Inferential statistics: correlations, Germany 2013

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | -,454** | 1 | | | | | | | |
| **AQI** | -,016 | ,018 | 1 | | | | | | |
| **SGI** | -,428** | ,313* | ,072 | 1 | | | | | |
| **DEPI** | -,014 | -,242 | -,086 | ,013 | 1 | | | | |
| **SGAI** | ,459** | -,018 | ,085 | -,484** | -,172 | 1 | | | |
| **TATA** | ,227 | ,270* | ,127 | ,126 | ,002 | ,080 | 1 | | |
| **LEVI** | ,131 | -,188 | ,105 | -,070 | -,009 | -,025 | -,142 | 1 | |
| **M-score** | ,757** | -,048 | -,224 | -,110 | ,105 | ,257* | ,579** | -,089 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 45. Inferential statistics: correlations, Germany 2014

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | -,077 | 1 | | | | | | | |
| **AQI** | ,002 | -,318* | 1 | | | | | | |
| **SGI** | -,392** | -,710** | ,115 | 1 | | | | | |
| **DEPI** | -,003 | -,288* | ,034 | ,175 | 1 | | | | |
| **SGAI** | ,762** | ,071 | ,181 | -,637** | -,195 | 1 | | | |
| **TATA** | -,163 | -,109 | ,499** | ,214 | ,099 | -,245 | 1 | | |
| **LEVI** | ,359** | ,029 | -,048 | -,174 | ,079 | ,202 | -,037 | 1 | |
| **M-score** | ,033 | ,365** | ,305* | -,089 | -,020 | -,130 | ,768** | -,169 | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

# Appendix 46. Inferential statistics: correlations, Germany 2009-2014

| | DSRI | GMI | AQI | SGI | DEPI | SGAI | TATA | LEVI | M-score |
|---|---|---|---|---|---|---|---|---|---|
| **DSRI** | 1 | | | | | | | | |
| **GMI** | ,015 | 1 | | | | | | | |
| **AQI** | ,005 | -,006 | 1 | | | | | | |
| **SGI** | ,098 | -,112* | -,007 | 1 | | | | | |
| **DEPI** | -,046 | -,079 | -,006 | -,005 | 1 | | | | |
| **SGAI** | ,170** | ,310** | ,064 | -,476** | -,107* | 1 | | | |
| **TATA** | ,107* | -,019 | ,072 | ,180** | ,073 | -,269** | 1 | | |
| **LEVI** | ,084 | -,023 | -,134* | -,130* | -,060 | ,150** | ,067 | 1 | |
| **M-score** | -,054 | ,204** | ,124* | ,013 | ,132* | -,108* | ,609** | -,252** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).